CellPath™ 300 ATM WAN Multiplexer Installation and Maintenance Manual

Software Version 1.3

FORE Systems, Inc.

Legal Notices

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FCC CLASS A NOTICE

<u>WARNING</u>: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void this user's authority to operate this equipment.

NOTE: The *CellPath*™ 300 has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of the equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

DOC CLASS A NOTICE

This digital apparatus does not exceed Class A limits for radio noise emission for a digital device as set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la class A prescrites dans le reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

FCC REQUIREMENTS (Notice to Users of T1 Service)

The following instructions are provided to ensure compliance with the Federal Communications Commission (FCC) Rules, Part 68.

This device may be connected to the T1 network.

Before connecting your unit, you must inform the telephone company of the following information:

Table 1:

SOC	FIC	USOC
6.0N	04DU9-1SN	RJ48C

If the unit appears to be malfunctioning, it should be disconnected from the telephone lines until you learn if your equipment or the telephone line is the source of the trouble. If your equipment needs repair, it should not be reconnected until it is repaired.

If the telephone company finds that this equipment is exceeding tolerable parameters, the telephone company can temporarily disconnect service, although they will attempt to give you advance notice if possible.

Under the FCC Rules, no customer is authorized to repair this equipment. This restriction applies regardless of whether the equipment is in or out of warranty.

If the telephone company alters their equipment in a manner that will affect use of this device, they must give you advance warning so as to give you the opportunity for uninterrupted service. You will be advised of your right to file a complaint with the FCC.

CE NOTICE

Marking by the symbol **CE** indicates compliance of this system to the EMC (Electromagnetic Compatibility) directive of the European Community and compliance to the Low Voltage (Safety) Directive. Such marking is indicative that this system meets or exceeds the following technical standards:

> •EN 55022 - "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment."

> •EN 50082-1 - "Electromagnetic compatibility - Generic immunity standard Part 1: Residential, commercial, and light industry."

> •IEC 1000-4-2 - "Electromagnetic compatibility for industrial-process measurement and control equipment Part 2: Electrostatic discharge requirements." - Severity level 3.

> •IEC 1000-4-3 - "Electromagnetic compatibility for industrial-process measurement and control equipment Part 3: Radiate electromagnetic field requirements." - Severity level 2.

> •IEC 1000-4-4 - "Electromagnetic compatibility for industrial-process measurement and control equipment Part 4: Electrical fast transient/burst requirements." - Severity level 2.

CERTIFICATIONS

ETL certified to meet Information Technology Equipment safety standards UL 1950, CSA 22.2 No. 950, and EN 60950.

CANADIAN IC CS-03 COMPLIANCE STATEMENT

NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Industry Canada label does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

VCCI CLASS 1 NOTICE

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従って、住宅地域またはその隣接した地域で使用すると、ラジオ、テレビジョン受信機等に受信障害を与えることがあります。

取扱説明書に従って正しい取り扱いをして下さい。

This equipment is in the Class 1 category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council For Interference by Information Technology Equipment aimed at preventing radio interference in commercial and/or industrial areas. Consequently, when used in a residential area or in an adjacent area thereto, radio interference may be caused to radios and TV receivers, etc. Read the instructions for correct handling.

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Preface

The intent of this manual is to supply users of the *CellPath*™ 300 ATM WAN Multiplexer with all the necessary information to install and maintain the *CellPath* 300 successfully. If questions or problems with the installation arise, please contact FORE Systems' Technical Support.

Chapter Summaries

Chapter 1 - Getting Started - Describes site and environmental requirements and shows how to unpack and inspect the shipment.

Chapter 2 - Installation - Explains how to mount the unit on a desktop or in a standard equipment rack, how to connect a terminal to the *CellPath* 300 communication port, how to power up both the AC and DC models, and how to log into the unit.

Chapter 3 - Connecting Cables - Shows how to connect cables to the various ports and specifies which cables and connectors to use.

Chapter 4 - Adding/Replacing Components - Shows how to install new modules or replace the power supply in the *CellPath* 300.

Chapter 5 - Performance Monitoring - Describes how to access and interpret the statistics on each port for performance monitoring purposes.

Chapter 6 - Troubleshooting - Provides information to assist in troubleshooting alarm indicators, how to interpret the event history report, alarm priorities and the order in which they should be resolved, and alarm conditions and possible solutions for them.

Chapter 7 - Loopbacks - Describes the loopbacks that can be set on the *CellPath* 300 physical module interfaces.

Appendix A - Connector Pinouts - Provides pinouts of the various interfaces found on the *CellPath* 300.

Appendix B - LED Definitions - Provides information on the LEDs found on the front of the *CellPath* 300 physical modules and how to interpret them.

Technical Support

In the U.S.A., you can contact FORE Systems' Technical Support using any one of the following methods:

1. If you have access to the Internet, you may contact FORE Systems' Technical Support via e-mail at:

   support@fore.com

2. You may telephone your questions to "support" at:

   800-671-FORE or 724-635-3700

3. You may FAX your questions to "support" at:

   724-742-7900

4. You may send questions, via U.S. Mail, to:

   FORE Systems, Inc.
   1000 FORE Drive
   Warrendale, PA 15086-7502

Technical support for non-U.S.A. customers should be handled through your local distributor.

No matter which method is used for support, please be prepared to provide your support contract ID number, the serial number(s) of the product(s), and as much information as possible describing your problem/question.

Typographical Styles

Throughout this manual, all specific commands meant to be entered by the user appear on a separate line in bold typeface. In addition, use of the Enter or Return key is represented as <ENTER>. The following example demonstrates this convention:

cd /usr <ENTER>

File names that appear within the text of this manual are represented in the following style: "...the fore_install program installs this distribution."

Command names that appear within the text of this manual are represented in the following style: "...using the **flush-cache** command clears the bridge cache."

Subsystem names that appear within the text of this manual are represented in the following style: "...to access the **bridge** subsystem..."

Parameter names that appear within the text of this manual are represented in the following style: "...using *<seg-list>* allows you to specify the segments for which you want to display the specified bridge statistics."

Any messages that appear on the screen during software installation and network interface administration are shown in Courier font to distinguish them from the rest of the text as follows:

```
.... Are all four conditions true?
```

Important Information Indicators

To call your attention to safety and otherwise important information that must be reviewed to insure correct and complete installation, as well as to avoid damage your system, FORE Systems utilizes the following *WARNING/CAUTION/NOTE* indicators.

WARNING statements contain information that is critical to the safety of the operator and/or the system. Do not proceed beyond a **WARNING** statement until the indicated conditions are fully understood or met. This information could prevent serious damage to the operator, the system, or currently loaded software, and will be indicated as:

WARNING!

Hazardous voltages are present. To lessen the risk of electrical shock and danger to personal health, follow the instructions carefully.

Information contained in **CAUTION** statements is important for proper installation/operation. **CAUTION** statements can prevent possible equipment damage and/or loss of data and will be indicated as:

CAUTION

You risk damaging your equipment and/or software if you do not follow these instructions.

Information contained in **NOTE** statements has been found important enough to be called to the special attention of the operator and will be set off from the text as follows:

NOTE

Steps 1, 3, and 5 are similar to the installation for the computer type above. Review the previous installation procedure before installation in your particular model.

Laser Warning

> **Class 1 Laser Product:**
> **This product conforms to**
> **applicable requirements of**
> **21 CFR 1040 at the date of**
> **manufacture.**

Class 1 lasers are defined as products which do not permit human access to laser radiation in excess of the accessible limits for Class 1 for applicable wavelengths and durations. These lasers are safe under reasonably foreseeable conditions of operation.

The *CellPath* 300 OC-3c/STM1 single-mode physical layer modules contain Class 1 lasers.

Safety Agency Compliance

This preface provides safety precautions to follow when installing a FORE Systems, Inc., product.

Safety Precautions

For your protection, observe the following safety precautions when setting up your equipment:

- Follow all warnings and instructions marked on the equipment.
- Ensure that the voltage and frequency of your power source matches the voltage and frequency inscribed on the equipment's electrical rating label.
- Never push objects of any kind through openings in the equipment. Dangerous voltages may be present. Conductive foreign objects could produce a short circuit that could cause fire, electric shock, or damage to your equipment.

Symbols

The following symbols appear in this book.

WARNING!

Hazardous voltages are present. If the instructions are not heeded, there is a risk of electrical shock and danger to personal health.

CAUTION

If instructions are not followed, there is a risk of damage to the equipment.

Modifications to Equipment

Do not make mechanical or electrical modifications to the equipment. FORE Systems, Inc., is not responsible for regulatory compliance of a modified FORE product.

Placement of a FORE Systems Product

CAUTION

To ensure reliable operation of your FORE Systems product and to protect it from overheating, openings in the equipment must not be blocked or covered. A FORE Systems product should never be placed near a radiator or heat register.

Power Cord Connection

WARNING!

FORE Systems products are designed to work with single-phase power systems having a grounded neutral conductor. To reduce the risk of electrical shock, do not plug FORE Systems products into any other type of power system. Contact your facilities manager or a qualified electrician if you are not sure what type of power is supplied to your building.

WARNING!

Your FORE Systems product is shipped with a grounding type (3-wire) power cord. To reduce the risk of electric shock, always plug the cord into a grounded power outlet.

Preface

CellPath 300 ATM WAN Multiplexer Installation and Maintenance Manual

CHAPTER 1 — Getting Started

This chapter describes how to prepare for installation of the *CellPath* 300. Topics include:

- Selecting an appropriate installation site
- Unpacking the shipping cartons and inspecting their contents to ensure there is no shipment damage
- Taking inventory of the carton contents to ensures that all of the correct components have been received

1.1   Site Selection

The installation site for the *CellPath* 300 must meet certain requirements for safety, power and grounding, ambient temperature and humidity control, physical space, and electrostatic protection.

1.1.1   Controlling Access

The *CellPath* 300 chassis features a removable front cover that allows access to an internal modular card cage. This internal card cage has energy levels exceeding 240 VA when two power supplies are installed in the chassis. Therefore, the chassis front cover is intended to be removed only by qualified service personnel, and any procedures in this manual that require removal of the front cover and/or the removal of modules or power supplies are intended to be performed only by qualified service personnel.

If installing the *CellPath* 300 in a non-controlled access location when the chassis has two installed power supplies, it is necessary to install the front-panel latch guards that were shipped with the chassis. A non-restricted access area is any area readily accessible to equipment operators as well as equipment service personnel. The front-panel latch guards prevent the chassis front cover from being removed easily without the use of a tool. They help ensure limited access to the chassis card cage and are a safety requirement in a non-controlled access location.

In a controlled access location, it is not necessary to install the front-panel latch guards.

WARNING!

When two power supplies are installed in the chassis, energy levels in the internal card cage may exceed 240 VA. Access to the internal chassis card cage is restricted to trained and qualified service personnel. If the chassis is installed in a non-restricted access location, the chassis front-panel latch guards must be installed as instructed in Section 2.1.4.

1.1.2   Power

The *CellPath* 300 operates from AC or DC power, depending on the type of power supplies installed. Make sure that the installation site provides an appropriate power source for the chassis configuration. The power requirements are listed below. They include tolerances.

Two AC power supplies are available:

- For North America: 120 VAC 60 Hz nominal, 8.0 A maximum (100 to 132 VAC maximum operating range)
- For other sites: 230 VAC 50 Hz nominal, 4.0 A maximum (190 to 264 VAC maximum operating range)

When using an AC supply, the AC branch circuit receptacle should be installed near the equipment and should be easily accessible. Do not attach the power supply cord to building surfaces.

One DC power supply is available: 48 VDC nominal, 9.0 A maximum (42 to 60 VDC maximum operating range).

The chassis power consumption with both power supplies is 250 W nominal (400 W maximum).

CAUTION

Damage to the *CellPath* 300 chassis or its installed components may occur if the input voltage applied to the chassis is not within the specified range.

1.1.3   Grounding

The chassis is grounded through its power supply connector. The AC power supply is designed to connect to a power source that has a protective-ground contact. It is grounded through a grounding conductor in its power cord. The DC supply is grounded by attaching facilities ground to the ground terminal on the supply.

1.1.4   Environmental Ranges

The work area selected for the *CellPath* 300 must fall within certain environmental limits.

- Nominal operating temperature: 0°C to 40°C
- Non-operating temperature: -20°C to 66°C
- Humidity: 5% to 95% RH, non-condensing

1.1.5   ESD Precautions

Electrostatic discharge (ESD) is potentially damaging to circuitry in the *CellPath* 300. Set up the work area to limit the effects of ESD. It is recommended that a ground strap be worn when handling the modules and that antistatic mats be utilized within the work area.

1.1.6   Space Requirements

The physical dimensions of the chassis are shown on Figure 1.1.

The chassis has vents in its left side-panel and fans in the top of its rear card cage and in each of its installed power supplies. Clearances of 0.10 in. (2.5 mm) to the left and 3 in. (76.2 mm) to the rear of the chassis are required for air flow and cooling.

If the chassis is mounted on a desktop, the chassis feet provide enough clearance on the bottom. If the chassis is installed in an equipment rack, leave at least one rack unit—1.75 in. (44.5 mm)—space open below the chassis.

CAUTION

Damage to the *CellPath* 300 chassis or its installed components may occur if appropriate clearances are not provided for cooling.
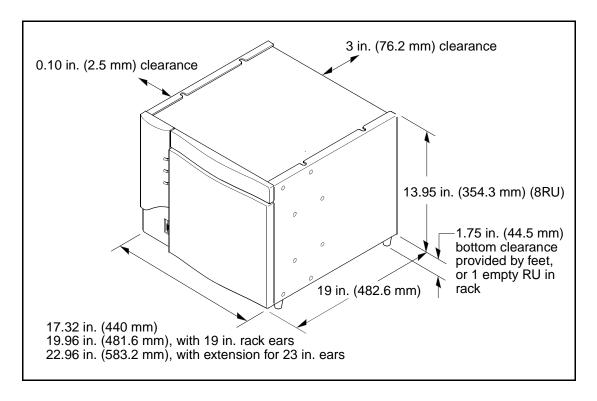
Figure 1.1 - Chassis Dimensions and Clearance Requirements

1.2   Unpacking the *CellPath* 300

Once the installation site has been selected, unpack the *CellPath* 300 shipment. Inspect the shipment carefully to ensure that there is no shipment damage.

Start by inspecting the shipping cartons for shipment damage. If there is evidence of shipment damage to the cartons, notify the shipping carrier and call FORE Systems' Customer Service representative.

1.2.1   Standard Accessories

If the cartons show no damage, unpack the shipment. There should be at least one large carton that contains:

- The *CellPath* 300 ES chassis, with installed System Controller and Extension modules
- Rack-mount ears for 19 in. rack (pre-installed on chassis)
- Front-panel latch guards
- The *CellPath* 300 documentation set

1.2.2   Optional Accessories

Protocol modules, physical layer modules, and power supplies are installed in the chassis at the factory if ordered as part of a pre-configured system. If ordered as separate components, they are shipped in separate cartons.

Depending on the order, there may also have several smaller cartons containing optional accessories such as physical layer port cables and adapters or power cords, or a rack extension for a 23-inch rack. At a minimum, the following optional accessories are required:

- A serial comm port cable (PC AT-type compatible)
- An interface cable for each physical layer interface port
- An AC power cord if an AC power supply is installed

If these accessories have not yet been ordered, see Chapter 3 for a description of all cables and adapters available for the various types of interface ports.

Figure 1.2 illustrates the major *CellPath* 300 components.

Chassis, includes:

System Controller module
Extension module
Pre-installed physical layer modules
Pre-installed protocol modules
Pre-installed power supplies
Rack-mount ears for 19 in. rack
Front-panel latch guards
Retainer brackets for Earthquake Risk Zone

The serial cable for the comm port is an optional accessory.

The AC power cord is ordered as an accessory with an AC power supply.

A rack extension kit is available as an accessory for installing the unit in a 23 in. rack.

DC Power Supply
DC power cord ordered is user-supplied

AC Power Supply
AC power cord ordered as an accessory

Physical Layer Module
Cable and adapters ordered separately

Protocol Module

Figure 1.2 - *CellPath* 300 Components

1.3   Inventorying of the Shipment

Compare the shipment against the invoice. View the physical modules and power supplies installed in the chassis by looking at the slots in the rear panel. To view the protocol modules installed in the chassis, remove the chassis front cover.

1.3.1   Remove the Chassis Front Cover

To verify the entire shipment, remove the chassis front cover in order to view the installed System Controller and protocol modules. To remove the cover:

1. Press up on the latch indentations located on the bottom left and right corners of the chassis cover to release the cover latches, then pull the bottom of the cover away from the chassis see Figure 1.3).

2. Pull the cover down and off the chassis.
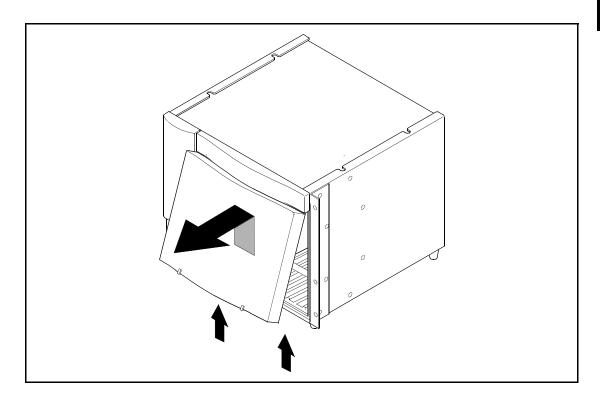
Figure 1.3 - Removing the Chassis Front Cover

WARNING!

Energy levels greater than 240 VA of power may be present on the internal chassis midplane if two power supplies are installed. To avoid personal injury adhere to the safety precautions listed at the front of this manual when accessing the internal components of the chassis. Only qualified service personnel should remove the chassis cover.

WARNING!

Do not leave the front cover off during normal operation of the chassis. Adherence to EMI, ESD protection, thermal cooling, and safety standards require that the cover be in place.

1.3.2   Protocol Modules

With the chassis front cover removed, verify that a System Controller module and all ordered protocol modules were received. Figure 1.4 illustrates a sample *CellPath* 300 configuration and the location of modules.

NOTE

Make sure the System Controller and all of the protocol modules are fully seated, with their ejector tabs down and latched behind the guides on the chassis.
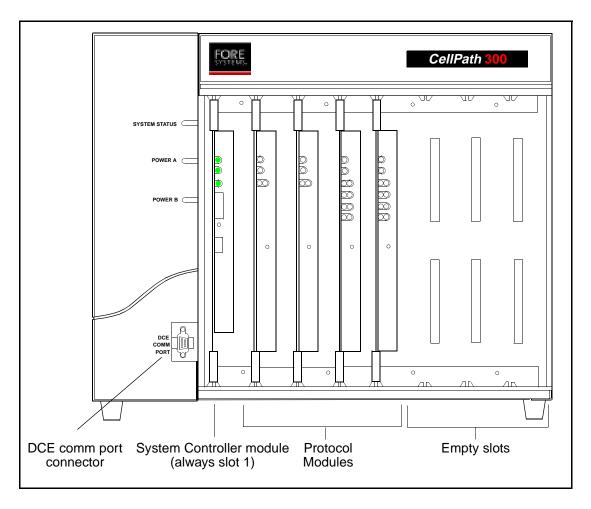
Figure 1.4 - *CellPath* 300 Chassis Front

CAUTION

Internal chassis components are susceptible to ESD. Use appropriate precautions when removing the chassis cover.

1.3.3 Physical Layer Modules and Power Supplies

The Extension module, all installed physical layer modules, and installed power supplies are visible from the rear of the chassis. Figure 1.5 illustrates a sample *CellPath* 300 configuration and the location of modules and power supplies.
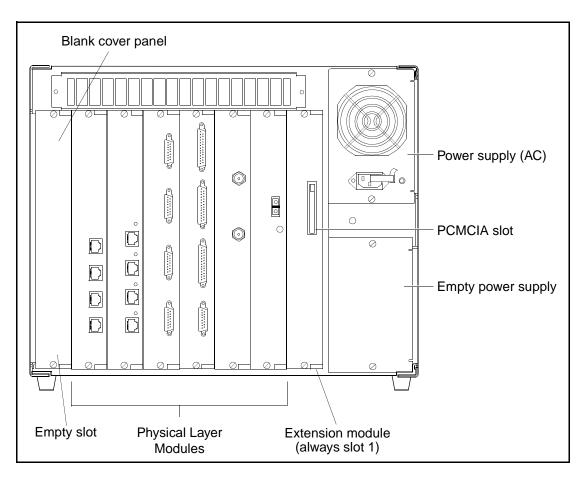
Figure 1.5 - *CellPath* 300 Chassis Rear

CAUTION

Blank cover panels must be installed during normal operation of the chassis. Adherence to EMI, ESD protection, and thermal cooling require that these panels be installed.

1.3.4   Replacing the Chassis Front Cover

Once the shipment has been verified, replace the chassis front cover.

1.   Insert the guides on the top edge of the cover into their matching slots in the bottom edge of the chassis top panel (see Figure 1.6).

2.   Once the guides are inserted, push the bottom of the cover onto the chassis until the cover latches snap into place.
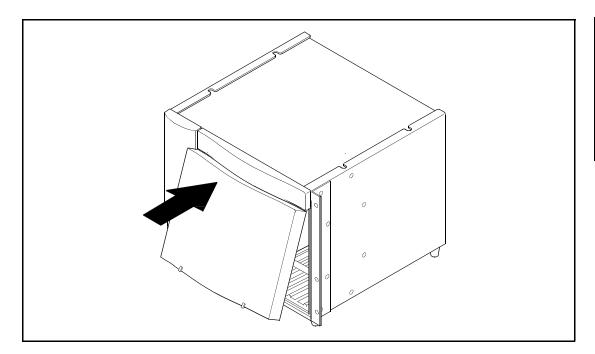
Figure 1.6 - Replacing the Chassis Front Cover

CHAPTER 2   Installation

This chapter explains the initial installation procedures for the *CellPath* 300. It is assumed that all modules and power supplies are already installed in the chassis. If this is not the case, refer to Chapter 3 for information about installing components. Topics covered include:

- Installing the chassis on a desktop or in a standard equipment rack
- Connecting a terminal to the comm port
- Comm port DIP switches
- System Controller configuration DIP switches
- Supplying power
- Self-test diagnostics

After completing the installation described in this chapter, the *CellPath* 300 is ready to connect the interface cables.

2.1   Chassis Installation

The chassis can be installed as a stand-alone unit on a desktop or it can be mounted in a standard 19 or 23 in. equipment rack.

2.1.1   Clearance Requirements

The chassis has vents in its left side panel and fans in the top of its rear card cage and in each of its installed power supplies. Clearances of 0.10" (2.5 mm) to the left and 3" (76.2 mm) to the rear of the chassis are required for proper air flow and cooling. If the chassis is mounted on a desktop, the chassis feet provide enough clearance on the bottom. If the chassis is installed in an equipment rack, one rack unit (1.75 in. (4.45 cm)) space must be open below the chassis.

2.1.2   Desktop Mounting

The *CellPath* 300 can stand alone on a flat surface, as long as the clearance requirements specified above are adhered to. Appropriate clearance for the bottom of the chassis is supplied automatically by the rubber feet that are installed on the chassis prior to shipment. Do not remove the feet.

2.1.3 Rack Mounting

The *CellPath* 300 can be mounted in a standard equipment rack. Mounting ears for a 19" rack are provided as standard accessories and are mounted on the chassis prior to shipment. An extension plate for mounting the unit in a 23" rack is available as an optional accessory and must be installed by the user.

The *CellPath* 300 takes up a total rack space of 9 RUs. 8 RUs are required for the chassis, and 1 empty RU is required below the chassis for cooling. The clearance requirements for the left and rear of the chassis must also be adhered to.

There is no clearance requirement for the top of the chassis.

Figure 2.1 shows how to mount the *CellPath* 300 in a 19" rack. The left and right ears should already be installed: if not, install them as shown using the four screws provided with the ears. A #2 Phillips screwdriver is required.

Figure 2.2 shows how to mount the *CellPath* 300 in a 23" rack. Install the optional extension plate on the left side of the chassis (looking at the chassis from the front) in order to ensure air flow through the chassis left-side vent holes. Use the four screws provided with the extension plate to secure it to the chassis rack ear. A #2 Phillips screwdriver is required.

WARNING!

A fully loaded *CellPath* 300 chassis weighs approximately 60 lbs (27 kg). Use care when lifting the unit into a rack. Use guide pins to secure the chassis into position before bolting it to the rack.
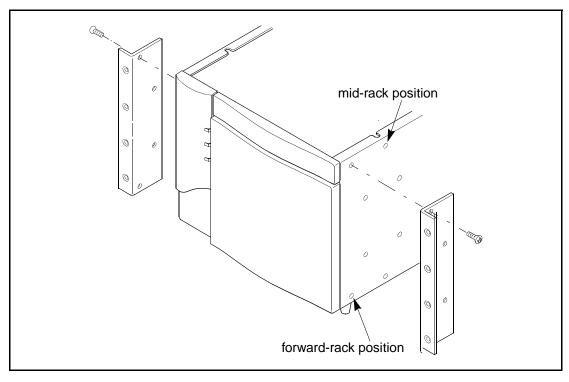
Figure 2.1 - Rack Mounting in a 19" Rack
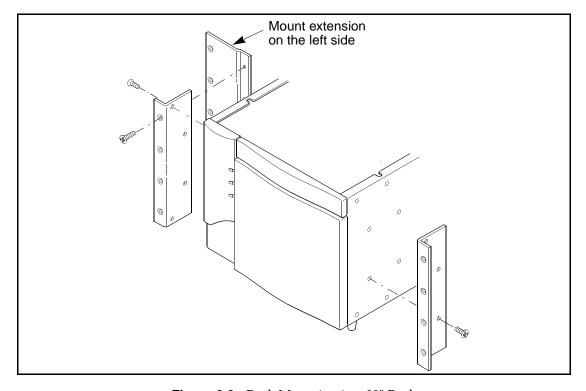
Figure 2.2 - Rack Mounting in a 23" Rack

2.1.4   Installing Retainer Brackets for Earthquake Safety

In order to meet the Network Equipment-Building System (NEBS) requirements for equipment that is installed in an Earthquake Risk Zone 4, as described in Bellcore Generic Requirements document GR-CORE Issue 1, October 1995, the *CellPath* 300 front panel must be secured in such a way as to eliminate the possibility of it falling onto other equipment or personnel during a severe earthquake.

Use one of the two retainer brackets in this kit to bring the *CellPath* 300 into compliance with this requirement.
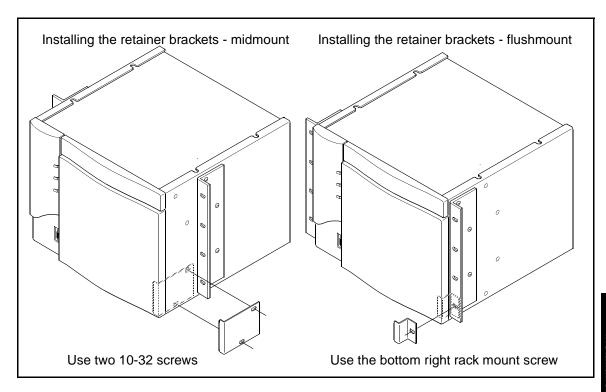
Figure 2.3 - Installing Retainer Brackets

2.2   Connecting a Terminal to the Comm Port

Before powering up the *CellPath* 300, connect a terminal to the DCE comm port on the front panel. This allows viewing of the *CellPath* 300 self-test diagnostics during power-up. The serial cable for the comm port is a standard PC AT-type compatible cable. It is available as an optional accessory.

The *CellPath* 300 DCE comm port is set to the following defaults: 9600 baud, 8 data-bits-per-character, 1 stop-bit-per-character, no parity, no DTR and character-echo enabled. If a VT100 terminal or VT100 emulator is being used, ensure that the emulator settings are set up correctly for the *CellPath* 300. Also make sure that the `Function` keys and `Shift-Tab` keys are mapped appropriately. Procedures for changing the port settings are provided in Section 2.3.

2.2.1   Terminal Types Supported

- VT100
- Sun shelltool (OpenWindows)

NOTE ➤ If using VT220, VT320 or VT420 terminals, set up the terminal to emulate a VT100 and then use the `<PF2>` key to invoke the `F2` functionality (i.e., pop-up a choice list for those fields which have choice lists installed).

2.2.2   VT100 Terminal Setup

If a VT100 terminal or VT100 emulator is being used, ensure that the emulation settings are set up correctly for the *CellPath* 300. Also, ensure that the `Function` keys and `Shift-Tab` keys are mapped appropriately.

General guidelines for setting up a VT100 terminal are:

- Set the software to emulate a DEC VT100 terminal. (This option is available on most terminal emulation software.)
- Set the terminal emulator for 24 lines x 80 columns.
- Turn `OFF` "`local echo`" if it is offered as a selection.
- Turn `OFF` "`line wrap`" if it is offered as a selection.
- Turn `OFF` "`carriage return`" (`CR`) or "`carriage return/line feed`" (`CR-LF`) translation if it is offered as a selection.
- Set the software to full duplex connection, 8 data bits, 1 stop bit, and no parity.

- Set `Xon/Xoff` to "not used" if it is offered as a selection.
- Enable or disable DTR as appropriate to match the SW8 setting of the *CellPath* 300 comm port DIP switches (see Section 2.3).
- Set the terminal baud rate to match the SW1 and SW2 settings of the *CellPath* 300 comm port DIP switches (see Section 2.3).

2.2.3   Required Key Mappings

If using VT100 emulation, the `Function keys` and `Shift-Tab` may not be correctly mapped and may not work as described. Table 2.1 shows the correct mapping.

Table 2.1 - VT100 Key Mapping

Key	Decimal Mapping	HEX Mapping	Key Mapping
F2	027 079 081	1B 4F 51	Esc O Q (O, not zero)
F7	027 079 113	1B 4F 71	Esc O q (O, not zero)
F8	027 079 114	1B 4F 72	Esc O r (O, not zero)
Shift-Tab	027 098	1B 62	Esc b

NOTE If a mouse is connected with the terminal emulation program, do not use it with the *CellPath* 300 user interface. The interface does not support a mouse.

2.2.4   Using Microsoft Windows 3.1 Terminal Emulator

When using Microsoft Windows 3.1, set `Terminal Emulation` to VT100. Set the `Terminal Preferences` as described in the Table 2.2.

Table 2.2 - Windows 3.1 Terminal Preferences

Option	Set to...
Line wrap	off
Local echo	off
Columns	80
CR->CR/LF (both Inbound and Outbound)	off
Terminal font	Fixedsys 15

Table 2.2 - Windows 3.1 Terminal Preferences

Option	Set to...
Cursor	Block or Underline (either setting is acceptable)
Cursor blink	on
Translations	none
Function, Arrow, and Ctrl keys for Windows	off

2.2.5 Using ProComm Plus 2.1 for Windows

When using ProComm Plus 2.1 for Windows, set the `Terminal Options` as shown in Table 2.3 and the port settings as shown in Table 2.4.

Table 2.3 - ProComm Plus 2.1 Terminal Options

Option	Set to...
Current Terminal	VT100
Terminal update	Incremental
Terminal size	24 rows x 80 columns
Screen scroll	off
Line wrap	off
Incoming CR to CR/LF	off

Table 2.4 - Procomm Plus 2.1 Port Options

Option	Set to...
Baud rate	Match the *CellPath* 300 setting
Parity	None
Data bits	8
Stop bits	0 (None)
Line wrap	off
Full Duplex	on

Set the `Terminal Fonts` to "`PCPlus 437 from PW 1.`" (This is the recommended font; others may work also.)

2.2.6   Using PC/TCP Microsoft WinApps 3.1

When using PC/TCP for Microsoft Windows 3.1, select the TNVT icon (Telnet).

Once a Telnet session is opened, select `Settings` from the menu bar.

Select `Terminal Emulation` and check all check boxes that are not already checked, EXCEPT `Enable Bell.` Leave `Enable Bell` unchecked.

Select `Terminal Preferences` and specify the following:

- Select Terminal Emulation Mode `VT-100 DEC charset.`
- Set the VT-100 Terminal ID radio button to `VT-100.`
- Set the Enter Key radio button to `CR.`
- Set the Auto wrap check box to `NOT checked (off).`

Installation

2.3   Setting the Comm Port DIP Switches

The default settings of the *CellPath* 300 comm port are `9600 baud`, `no parity`, `8 data-bits-per-character`, `1 stop-bit-per-character`, and `no DTR`. To change the default settings, reset the comm port DIP switches, located on the System Controller module, as shown in Figure 2.4. The System Controller Comm Port DIP switch settings are listed in Table 2.5.
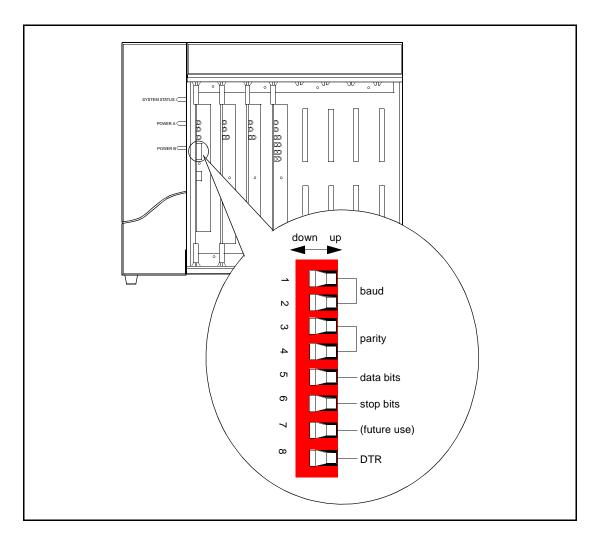
Figure 2.4 - Location of Comm Port DIP Switches

Table 2.5 - System Controller Comm Port DIP Switch Settings

Parameter	Switch(es)		Notes
Baud Rate	SW1	SW2	
2400	up	down	
9600	down	down	default
19200	down	down	
38400	up	up	
Parity	SW3	SW4	
none	down	down	default
none	down	up	
odd	up	down	
even	up	up	
Data Bits	SW5		
7 data bits	up		
8 data bits	down		default
Stop Bits	SW6		
1 stop bit	down		default
2 stop bits	up		
	SW7		reserved for future use
DTR	SW8		
DTR not required	down		default
DTR required	up		

2.4 Setting the System Controller Configuration DIP Switches

The *CellPath* 300 default is to run the recent version of operating software and the recently saved configuration database. Check the System Controller configuration DIP switches to ensure that the defaults are set for initial bootup or normal reboot of the system.

The software configuration DIP switches are on the System Controller module, as shown in Figure 2.5. Table 2.5 lists the switch descriptions. To access this module, remove the chassis front cover.

Make sure that these switches are all set to the "down" position for a normal bootup.
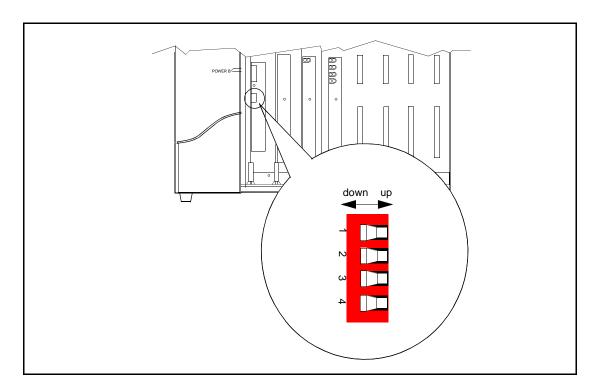
Figure 2.5 - Location of System Controller DIP Switches

2.5 Supplying Power

Power up the chassis by connecting its power cord to an appropriate power source. If two power supplies are installed in the chassis, connect both supplies to a power source. The power supplies are redundant and either supply can power the entire chassis if the other supply fails or is removed.

WARNING!

To avoid hazardous voltages never connect a power cord to a power supply that is not installed in the chassis.
Always disconnect the power cord before installing or removing a power supply.

CAUTION

DO NOT insert or remove the System Controller Module or the Extension Module once power has been supplied to the *CellPath* 300. Removing either of these modules with the unit under power can result in permanent damage.

2.5.1 AC Power Source

Connect an installed AC power supply to a grounded power receptacle of the appropriate voltage. The requirements are specified on the rear panel of the power supply.

1. Lift the interlock guard located over the input connector on the AC power supply. If the guard cannot be lifted easily, the power supply module may not be fully inserted into its chassis slot. Loosen the two screws on the supply, push the supply module into the slot until it is completely seated, then retighten the screws. The guard should be easy to lift now.

2. Plug the power cord into the input connector on the power supply.

3. Plug the other end of the cord into the power source receptacle.

2.5.2   DC Power Source

Connect an installed DC power supply to a power source capable of supplying the appropriate voltage and current. The requirements are specified on the rear panel of the supply.

WARNING!

Failure to perform Steps 1 and 2 can result in serious injury to the user or damage to the equipment.

To connect the supply (refer to Figure 2.6):

1. Make sure the DC supply is fully installed in the chassis and that the ON/OFF switch is set to the OFF (o) position. The power supply ON/OFF switch can be accessed by lifting the interlock lever.

2. Turn off the DC power source or disconnect the power cable from the source before wiring the cable to the power supply.

3. Prepare one 14 AWG (1.63 mm) or larger wire marked with green insulation and one or more yellow stripes to connect to frame ground (earth). Connect frame ground to the ground terminal. Strip 0.125" (3.2 mm) off the insulation from the plug end. Do not strip more than 0.25" (6.4 mm).

4. Prepare two 14 to 18 AWG (1.63 to 1.02 mm) wires to terminate in the DC power termination. Connect the positive battery source to the top terminal and the negative battery source to the second terminal. Strip 0.125" (3.2 mm), but not more than 0.25" (6.4 mm) off the insulation from the plug end of each wire.

    Attach the wires to the termination plug using a #2 Phillips screwdriver.
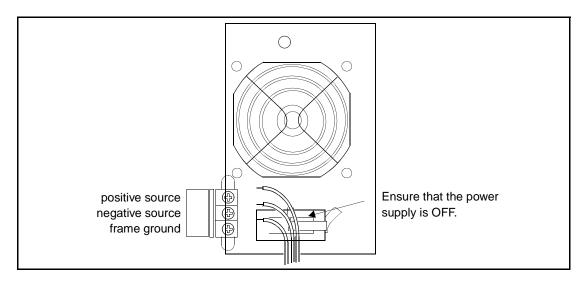
Figure 2.6 - DC Power Supply

5. When the wiring is complete, attach the other end of the power cable to the DC power source.

6. Power up the DC power source (48 VDC, nominal).

7. Finally, turn on the DC power supply by lifting the interlock guard and pushing the ON/OFF switch to the ON (I) position.

NOTE → If the DC power source is below the acceptable voltage threshold when the *CellPath* 300 DC power supply is turned on and if the power source is slow to rise to an acceptable voltage level, the power supply may not power up properly. Turn the power supply off, then on again once the power source is at an acceptable voltage threshold.

2.6   Self-Test Diagnostics

When the *CellPath* 300 powers up, it runs through a series of self-test diagnostics and then displays a "Welcome to the *CellPath* 300" login message on the comm port terminal. If the login message appears, the self-test has completed successfully and logins to the *CellPath* 300 are possible as described in the *CellPath 300 ATM WAN Multiplexer Configuration Manual.* If the login message does not appear, the *CellPath* 300 may have encountered a power-up or software initialization error, or the terminal may not be connected properly.

2.6.1   Successful Power-Up

The ultimate indicator of whether or not the *CellPath* 300 passed its diagnostic tests is whether or not the *CellPath* 300 login message appears on the comm port terminal. If a terminal is connected to the comm port before powering up the unit, the login message should appear within approximately 15 seconds. (If a terminal is connected after power up, press the `<ENTER>` key to obtain a password prompt.)

```
---Welcome to the CellPath 300 ! ---
Please enter your password:
```

2.6.2   LED Behavior

Other indicators of a successful power up are the front-panel LEDs. The POWER LEDs should be green for installed power supplies and extinguished for empty power slots. POWER A refers to the upper power supply slot and POWER B refers to the lower power supply slot. At least one POWER LED must be green.

The SYSTEM STATUS LED may be red or green, but should not be extinguished. If the LED is extinguished, the *CellPath* 300 encountered a power, self-test, or initialization error. The red/green state of the SYSTEM STATUS LED is mainly useful as an indicator of system health once all of the system ports have been connected and appropriately configured. At this stage of the installation process, a red SYSTEM STATUS is acceptable. (See Appendix B for a for a complete description of the LEDs and their meanings during normal operation.)

2.6.3   Unsuccessful Power-Up

The power-up is not successful if the *CellPath* 300 login message does not appear on the comm port terminal. Under these circumstances, the *CellPath* 300 has most likely encountered a self-test or software initialization error, or the terminal may not be connected properly. Start troubleshooting efforts as follows:

1. Verify that at least one power LED is green. If both power LEDs are extinguished, the chassis is not receiving required power.

2. Verify that the terminal is connected and powered properly. Refer to Section 2.2 for cabling procedures.

3. Verify that the *CellPath* 300 comm port and the terminal are set to the same baud rate and matching communication protocols. Refer to Section 2.3 for information about setting the communication protocols for the *CellPath* 300 comm port.

4. If using a VT100 terminal or VT100 emulator, make sure the terminal options are set correctly (see Section 2.2.2).

5. Once the terminal is connected and configured properly, press the <ENTER> key. A prompt requesting a password should appear. If it does not appear, continue with this procedure.

6. Remove the front panel of the chassis.

7. Look at the three LEDs on the System Controller module, as shown in the *CellPath 300 ATM WAN Multiplexer Configuration Manual*. If any one of the three LEDs is extinguished (i.e., is not illuminated as red, green, or yellow), then the *CellPath* 300 encountered a self-test or initialization error.

8. Make note of the LED color pattern and call FORE Systems' Technical Support.

Installation

CHAPTER 3   Connecting Cables

This chapter shows you the cabling requirements for the various *CellPath* 300 ports. This includes network ports, data ports, and the PCMCIA port that can be used to connect the unit to an Ethernet LAN for remote Telnet access. The only port connection not described in this section is the front-panel comm port.

The port types are covered in the following order:

- OC-3c/STM1 single-mode (page 3-2)
- OC-3c/STM1 multimode (page 3-4)
- DS3 (page 3-6)
- E3 (page 3-7)
- J2 (page 3-9)
- DSX-1 (page 3-10)
- E1 (page 3-11)
- IMA DS1 (page 3-13)
- IMA E1 (page 3-14)
- V.35/EIA-530 (page 3-15)
- HSSI (page 3-17)
- PCMCIA (page 3-18)

Refer to Appendix A for the pinouts for the above listed interface connectors.

Connecting Cables

3.1   OC-3c/STM1 Single-Mode Cabling

The OC-3c/STM1 Single-Mode port receives and transmits an optical serial data stream with core diameters of 8 microns. Fiber type is two (2) point-to-point single-mode 8 μm core fibers. Figure 3.1 shows the OC-3c/STM1 single-mode cable connections.

WARNING!

This is a class 1 laser source. Avoid eye exposure to laser beams at the port connector or cable ends.
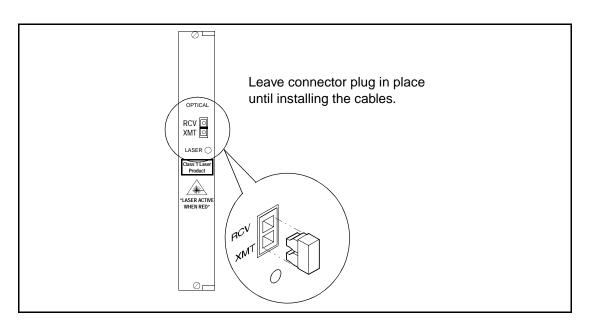
Figure 3.1 - OC-3c/STM1 Single Mode Interface Connections

NOTE

The LED on this module indicates whether the laser signal is active (red) or off (green). The laser signal is off by default. Turn the signal on by using a form field as described in the *CellPath 300 ATM WAN Multiplexer Configuration Manual.*

3.1.1   Connecting the Cable

1. Remove the plug from the connector sockets.

2. Remove the plugs from one end of the duplex cable and insert the cable connectors into the sockets. Align the guides on the cable connectors with the slots in the sockets.

3. Remove the plugs from the other end of the cable, then connect the cable to the network or terminal equipment. Refer to the appropriate manufacturer or carrier instructions.

NOTE A duplex SC fiber connector is used for this connection.

3.1.2   Maximum Cable Lengths

The maximum cable length is 20 miles (32 kilometers). Note that extra cable splices reduce this range.

CAUTION The cable allows a minimum bend radius of 1.5 in. (38 mm). Avoid crimping the cable, either by tightly coiling the cable or by using tight cable ties. Excessive crimping may damage the fiber cable.

Connecting Cables

3.2 OC-3c/STM1 Multimode Cabling

The OC-3c/STM1 Multimode port receives and transmits an optical serial data stream over multimode (mm) fiber with core diameters from 50 microns to 100 microns. Fiber type is two (2) point-to-point multimode fibers. Figure 3.2 shows the OC-3c/STM1 multimode cable connections.
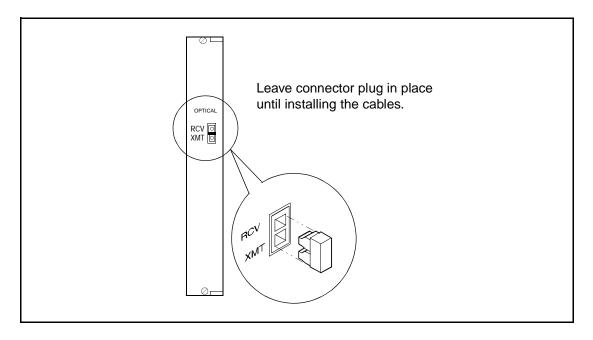
Figure 3.2 - OC-3c/STM1 Multimode Interface Connections

3.2.1 Connecting the Cable

1. Remove the plug from the connector sockets.

2. Remove the plugs from one end of the duplex cable and insert the cable connectors into the sockets. Align the guides on the cable connectors with the slots in the sockets.

3. Remove the plugs from the other end of the cable, then connect the cable to the network or terminal equipment. Refer to the appropriate manufacturer or carrier instructions.

NOTE

A duplex SC fiber connector is used for this connection.

3.2.2   Maximum Cable Lengths

The maximum cable length is 2 miles (3.2 kilometers), using a 62.5 µm core fiber with 500 MHz/km bandwidth. Note that extra cable splices reduce this range. For longer distances, use the OC-3c/STM1 single-mode physical layer module and single-mode fibers.

CAUTION

The cable allows a minimum bend radius of 1.5 in. (38 mm). Avoid crimping the cable, either by tightly coiling the cable or by using tight cable ties. Excessive crimping may damage the fiber cable.

Connecting Cables

3.3   DS3 Cabling

The DS3 port receives and transmits data over a 75-ohm coaxial cable, with BNC connectors. Figure 3.3 shows the DS3 cable connections.
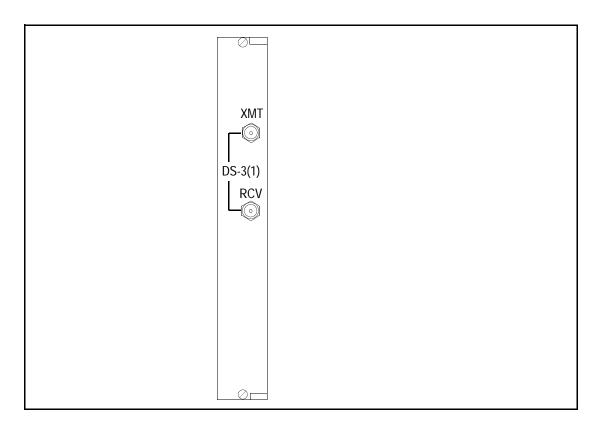
Figure 3.3 - DS3 Interface Connections

3.3.1   Connecting the Cable

1.   Connect the far-end receive connector to the DS3 transmit (XMT) output.
2.   Connect the far-end transmit connector to the DS3 receive (RCV) input.

3.3.2   Maximum Cable Lengths

The maximum cable length end-to-end is 900 ft. (274.32 m): 450 ft. (137.16 m) maximum from transmitter to cross-connect and 450 ft. (137.16 m) maximum from cross-connect to receiver.

3.4   E3 Cabling

The E3 port receives and transmits data over a 75-ohm coaxial cable, with BNC connectors. Figure 3.4 shows the E3 cable connections.
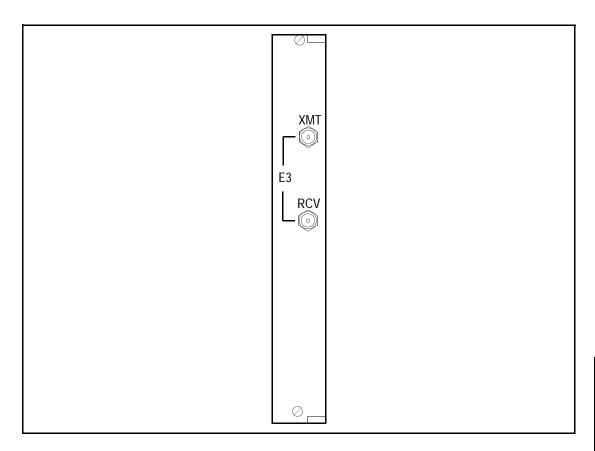
Figure 3.4 - E3 Interface Connections

NOTE ➤ To earth-ground the receive (RCV) BNC, unscrew the hex nut using a 14 mm wrench and remove the plastic washer behind the hex nut. Replace the hex nut and tighten a quarter turn past finger tight. The factory default setting is floating using a plastic washer as shown.

3.4.1   Connecting the Cable

1. Connect the far-end receive connector to the E3 transmit (XMT) output.
2. Connect the far-end transmit connector to the E3 receive (RCV) input.

3.4.2   Maximum Cable Lengths

Maximum cable length is 300 m (984.3 ft.).

3.5   J2 Cabling

The J2 port receives and transmits data over a 75-ohm coaxial cable, with BNC connectors. Figure 3.5 shows the J2 cable connections.
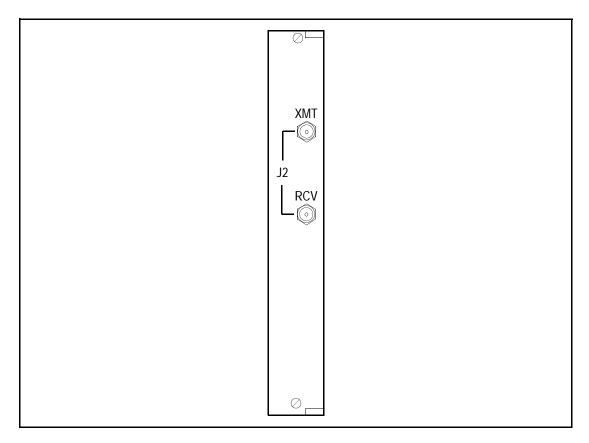
Figure 3.5 - J2 Interface Connections

3.5.1   Connecting the Cable

1.   Connect the far-end receive connector to the J2 transmit (XMT) output.
2.   Connect the far-end transmit connector to the J2 receive (RCV) input.

3.5.2   Maximum Cable Lengths

Maximum cable length is 200 m (656 ft.).

3.6   DSX-1 Cabling

The DSX-1 port receives and transmits data over a 100-ohm differential line, 15-pin female D connector. Figure 3.6 shows the DSX-1 cable connections.

NOTE

The DSX-1 is not a network interface. An external channel service unit (CSU) is required when connecting this interface to a public network. A cross-over cable is required if connecting this port to another DSX-1 interface.
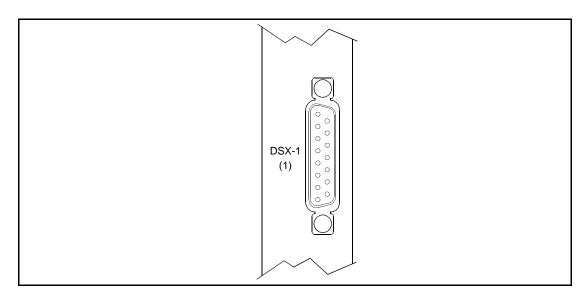
Figure 3.6 - DSX-1 Interface Connector

3.6.1   Connecting the Cable

1. Connect the cable to the port. Secure the cable connector to the panel with the screws built into the connector.

2. Connect the other end of the cable to the CSU or terminal equipment using the manufacturer or carrier instructions.

3.6.2   Maximum Cable Lengths

The maximum cable length is 655 ft. (199.6 m) from transmitter to cross-connect.

3.7   E1 Cabling

The E1 port receives and transmits data over a 120-ohm differential line, 15-pin, female D con-
nector. A 120-ohm to 75-ohm BNC adapter is available for coaxial cabling. Figure 3.7 shows
the E1 cable connections.
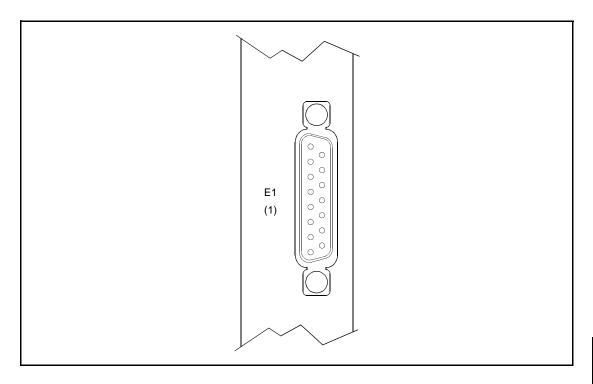
Figure 3.7 - E1 Interface Connector

3.7.1   Connecting the Cable

1. Connect the cable to the port. Secure the cable connector to the panel with the
    screws built into the connector.

2. Connect the other end of the cable to the network or terminal equipment using the
    manufacturer or carrier instructions.

Connecting Cables

3.7.2   Using the 75-ohm to 120-ohm E1 Adapter

For sites using coaxial cabling, a 75-ohm to 120-ohm adapter is available (Figure 3.8). Connect the adapter to the E1 D connector on the module, then connect transmit (TX) and receive (RX) as shown below. Each side of the adapter has a frame ground switch. Set one side of the adapter to frame ground (Earthed) and the other side to open, to avoid a ground loop.
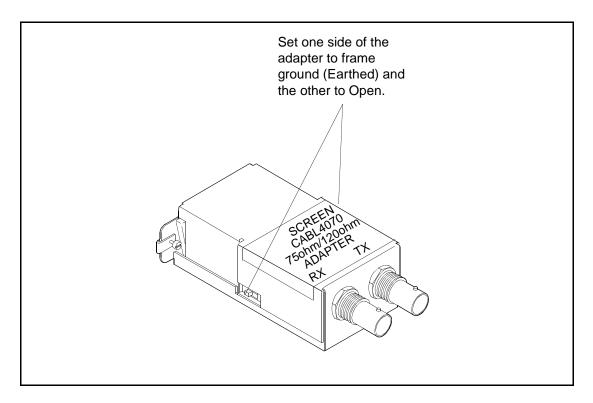
Figure 3.8 - 75 ohm/120 ohm E1 Adapter

3.8   IMA PLM/DS1 Cabling

The DS1 port receives and transmits data over a 100-ohm differential line, using RJ48C connectors. Figure 3.9 shows the IMA/PLM DS1 cable connections.
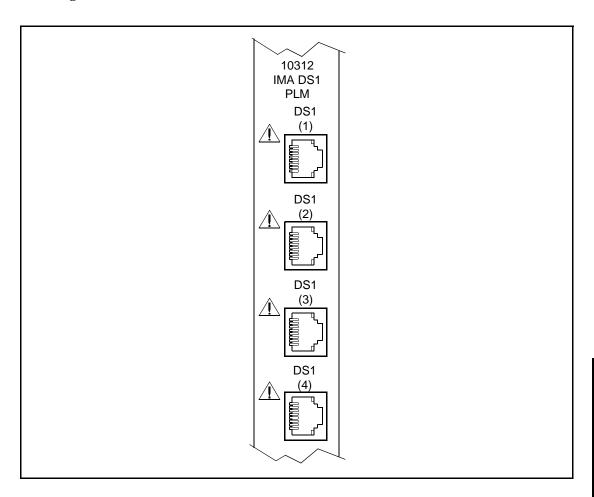
Figure 3.9 - IMA PLM/DS1 Interface Connectors

3.8.1   Connecting the Cable

1. Connect the cable to the port. Make sure that the connector snaps firmly into place.
2. Connect the other end of the cable to the network or terminal equipment using the manufacturer or carrier instructions.

3.9 IMA PLM/E1 Cabling

The E1 port receives and transmits data over a 120-ohm differential line using RJ45 connectors. Figure 3.10 shows the IMA PLM/E1 cable connections.
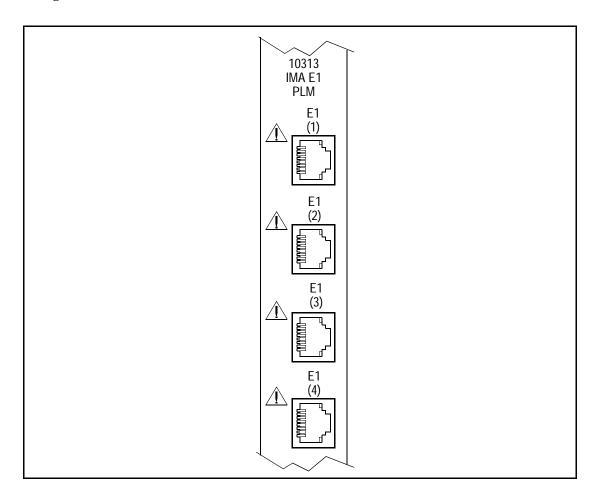
Figure 3.10 - IMA PLM/E1 Interface Connectors

3.9.1 Connecting the Cable

1. Connect the cable to the port. Make sure that the connector snaps firmly into place.

2. Connect the other end of the cable to the network or terminal equipment using the manufacturer or carrier instructions.

3.10 V.35/EIA-530 Cabling

The V.35/EIA-530 port is a 25-pin female data port. You can configure the port via system software to be a V.35-compatible or an EIA-530-compatible interface. The EIA-530 interface also supports EIA-449 (RS449) and X.21 pinouts with appropriate cabling. Figure 3.11 shows the V.35/EIA-530 cable connections.
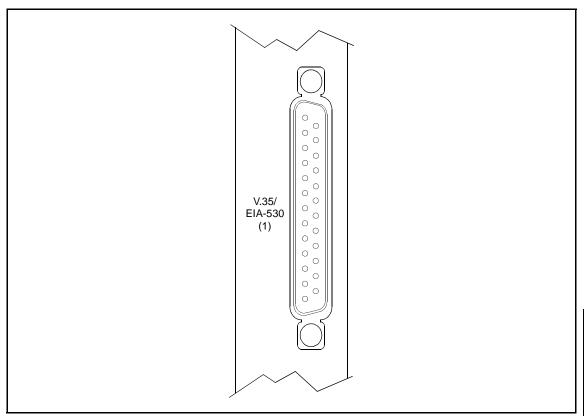
Figure 3.11 - V.35/EIA-530 Interface Connector

3.10.1 Connecting the Cable

1. Connect the cable to the data port. Secure the cable connector to the panel with the screws built into the connector.

2. Connect the other end of the cable to the terminal equipment according to the manufacturer's instructions.

3.10.2 Maximum Cable Lengths

The maximum cable length for the V.35 ⁄ EIA-530 interface is dependent on the interface protocol used.

V.35—50 ft. (15.2 m)

EIA-530—200 ft. (61 m)

X.21—200 ft. (61 m)

EIA-449 (RS449)—200 ft. (61 m)

3.11 HSSI Cabling

The HSSI port receives and transmits data over a serial line with 50-pin connectors. Figure 3.12 shows the HSSI cable connections.
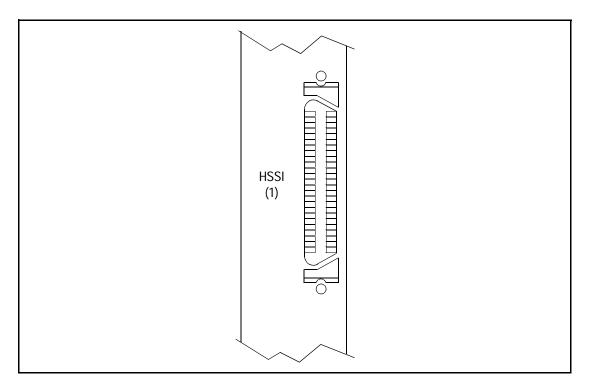
Figure 3.12 - HSSI Interface Connector

3.11.1 Connecting the Cable

1. Connect the cable to the data port. Make sure that the connector snaps firmly into place.
2. Connect the other end of the cable to the terminal equipment according to the manufacturer's instructions.

3.11.2 Maximum Cable Lengths

Maximum cable length is 50 ft. (15.2 m).

Connecting Cables

3.12 Ethernet PCMCIA Cabling

You can Telnet to the *CellPath* 300 via an Ethernet LAN connection. The chassis provides a PCMCIA card slot on the rear panel. The Ethernet PCMCIA Adapter Card is an optional accessory. Figure 3.13 shows the PCMCIA slot.
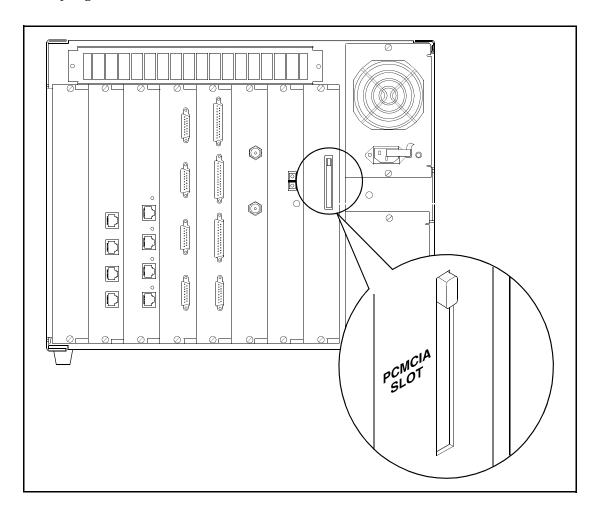
Figure 3.13 - PCMCIA Slot

The Ethernet PCMCIA Adapter Card is an optional accessory. It comes with a PCMCIA card and the required cable. The cable has a proprietary connector on the card end and a 10Base-T connector on the far end.

3.12.1 Installing the PCMCIA Ethernet Card

1. Plug the cable into the PCMCIA card.

2. Plug the card into the PCMCIA slot on the *CellPath* 300 rear panel. Ensure that the cable to the Ethernet card is securely connected. If the cable becomes loose, the network connection may be lost. To secure the connection, secure the Ethernet cable to the Extension module.

3. Connect the cable's 10Base-T connector to a 10Base-T wiring hub directly or through Ethernet cabling.

Additional instruction as required may be supplied with the accessory package.

To Ethernet Cabling
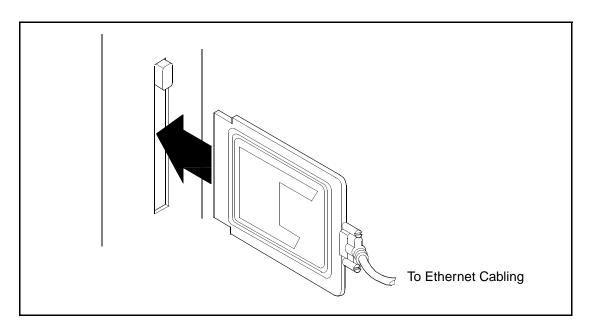
Figure 3.14 - Using the PCMCIA Slot for An Ethernet Connection

3.12.2 Changing Ethernet Cards in the PCMCIA Interface

ARP cache entries are used for the *CellPath* 300 Ethernet MAC address in the host(s) attempting to communicate with the *CellPath* 300. If the Ethernet card in the PCMCIA interface must be changed to a new or different Ethernet card, the ARP cache entries must be flushed. Most host systems typically flush aged ARP cache entries automatically. It is common for this to occur after a time-out of between 5 and 20 minutes, depending upon timing parameters set within each system host.

Connecting Cables

Connecting Cables

CHAPTER 4   Adding/Replacing Components

This chapter provides procedures to add or replace *CellPath* 300 components. The components described include:

- System Controller module
- Extension module
- Protocol modules ⁄ Physical layer modules
- Power supplies

4.1   Replaceable Components

The *CellPath* 300 is designed to simplify maintenance and upgrades. Internal modules and power supplies may be added or replaced in the chassis by qualified, on-site equipment service personnel.

4.1.1   Hot-Swappable Components

The following components can be replaced or added without powering down the *CellPath* 300 and disrupting network service.

- Protocol modules
- Physical layer modules
- Power supplies (to avoid disrupting service, at least one power supply must remain installed and powered up)
- Power supply fan tray

4.1.2   Components Not Hot-Swappable

To ease maintenance, the following system components are also replaceable. To replace these components the *CellPath* 300 must be powered off.

- System Controller module
- Extension module

4.1.3   Software Upgrades

As new *CellPath* 300 components and features are introduced, software upgrades which support those components and features are made available. The software upgrades can be easily loaded into the *CellPath* 300's memory. Procedures for upgrading software are covered in the *CellPath 300 ATM WAN Multiplexer Configuration Manual.*

4.2   Installing the Chassis Front-Panel Latch Guards

If the *CellPath* 300 unit contains two power supplies, and installation is in a non-restricted access area, install the chassis front-panel latch guards. A non-restricted access area is one that is readily accessible to equipment operators as well as equipment service personnel.

WARNING!

If the *CellPath* 300 chassis is installed in a non-restricted access area and two power supplies are installed, the chassis front-panel latch guards must be installed as instructed below.

To install the chassis front-panel latch guards:

1. Press up on the latch indentations on the bottom left and right corners of the chassis cover to release the cover latches.

2. Pull the bottom of the cover away from the chassis.

3. Pull the cover down and off the chassis.

4. Each latch guard is supplied with two flat-head screws. Use these screws to attach the guards onto the bottom of the chassis. For this purpose it may be necessary to tilt the chassis up slightly.

CAUTION

Never place the chassis on its rear, side, or top panels.

Adding/Replacing Components

4.2.1   Removing the Front Cover

Once the chassis front-cover latch guards are installed, a flat-bladed screwdriver is needed to remove the chassis front cover.

1. Insert a small flat-blade screwdriver into one of the latch rests located in the bottom corners of the cover. Push up on the latch through the hole in the latch guard, then pull that corner of the cover away from the chassis.

2. Insert the screwdriver into the latch rest on the opposite corner of the cover. Push up on the latch through the hole in the latch guard, then pull that corner of the cover away from the chassis.

3. Pull the cover down and off of the chassis.

4.2.2   Replacing the Front Cover

To replace the chassis front cover:

1. Insert the guides on the top edge of the cover into their matching slots on the top edge of the chassis top panel.

2. Once the guides are inserted, push the bottom of the cover onto the chassis until the cover latches snap into place.

4.3   Powering Down and Rebooting

Replacing certain components requires that the *CellPath* 300 system be powered down. This can be done in a "controlled" manner that allows for an easier reboot once the new component is in place.

Power down the *CellPath* 300 before replacing any of the following components:

- System Controller modules
- Extension modules
- Power supply (if only one power supply is installed; if two power supplies, it is possible to replace one without powering down the system)

4.3.1   Powering Down the *CellPath* 300

The first step in powering down the *CellPath* 300 is to halt the system via software. This type of halt causes the *CellPath* 300 to do three things. It logs out all users, it synchronizes the system FLASH memories and the nonvolatile configuration database (CDB) so that they all contain the most recent configuration changes, and it stops data flow within the system. If the system is not halted before removing power, configuration changes made within the last 60 to 90 seconds may not be saved.

NOTE Halt the system via a terminal connected to the *CellPath* 300 comm port. The system cannot be halted during a Telnet session since doing so might disconnect the Telnet link.

CAUTION A halt causes a disruption in service.

To halt the system:

1. Log in with a password that provides super user privileges.
2. Display the *CellPath* 300 `System Configuration` screen.
3. Tab to the `[Utilities...]` button (Figure 4.1) and press `<ENTER>`.
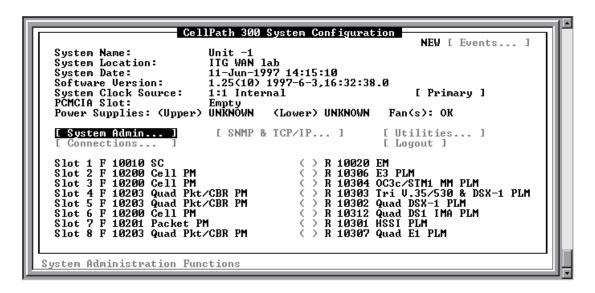
Figure 4.1 - *CellPath* 300 System Configuration Screen

4. In the *CellPath* 300 System Utilities screen, tab to the [Halt System] button (Figure 4.2) and press <ENTER>. A prompt is displayed requesting to confirm the operation.

```
┌──────────────────────────────────────────────────────────────────────────┐ ▲
│          ┌──────CellPath 300 System Configuration──────┐                   │
│                                                         [ Events... ]      │
│  System Name:           Unit -2                                            │
│  System Location:       ITG WAN lab                                        │
│  System       ┌──────CellPath 300 System Utilities──────┐                  │
│  Softwar      │                                                            │
│  System       │                                         [ Events... ]      │
│  PCMCIA       │                                                            │
│  Power S      │   [ Module Information... ]                                │
│               │                                                            │
│  [ Syste      │   [ Restore Defaults ]                                     │
│  [ Conne      │   [ Delete All Connections ]                               │
│               │   [ Halt System ]                                          │
│  Slot 1       │   [ Update Software from PCMCIA card... ]                  │
│  Slot 2       │   [ Update Software via TFTP... ]                          │
│  Slot 3       │   [ Save/Restore Config to TFTP host... ]                  │
│  Slot 4       │   [ HTTP Configuration... ]                                │
│  Slot 5       │   [ Reset System ]                            X-1 PLM      │
│  Slot 6       │   [ Reset Slot... ]                                        │
│  Slot 7       │                                                            │
│  Slot 8       │                                         [ ^Cancel ]        │
│               └────────────────────────────────────────┘                  │
│  Show event history report                                                 │ ▼
└──────────────────────────────────────────────────────────────────────────┘
```

Figure 4.2 - *CellPath* 300 System Utilities Screen

Once the system is halted, unplug the power cable(s) to the *CellPath* 300. This completes the power-down process.

Refer to the following sections for information about reboot procedures.

4.3.2   Selecting Restored Configuration Source

The default setting on the *CellPath* 300 is to load the most recently saved CDB upon startup. If replacing a System Controller or Extension module, override this default and force the *CellPath* 300 to ask for the database to load.

The *CellPath* 300 saves its CDB in two FLASH banks: one on the System Controller and one on the Extension module. Load the database from whichever module *was not replaced.*

To set up the *CellPath* 300 so that it asks which database to load, set software configuration DIP switch 3 to its "up" position. This DIP switch is located on the System Controller module (Figure 4.3).
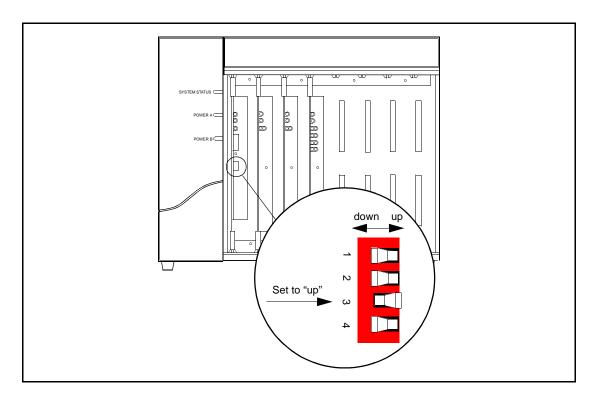
Figure 4.3 - *CellPath* 300 System Controller DIP Switch Setting

4.3.3   Rebooting the *CellPath* 300

Once DIP switch 3 is set up, connect the power cables to the *CellPath* 300.

The *CellPath* 300 powers up and run initial diagnostic tests. It then pauses and lists the available start-up configuration options (Figure 4.4). Select the desired database to load by entering the appropriate letter, in upper or lower case.

NOTE   If power was removed without halting the system, some options may not be available, depending on whether or not the memories and CDBs were in synch at the time of the power loss.

```
Starting system initialization
*** Software version in bank FLASH 0: 1.10(02) 1996-4-11,11:19:43.0
*** Software version in bank FLASH 1: 1.15(07) 1996-7-8,16:42:07.0
*** System code running from FLASH 1
Starting system configuration verification
*** System date and time are current
*** Loading system time from Real Time Clock
*** SC configuration FLASH is valid, date: 2004-2-13,5:58:43.0
*** EM configuration FLASH is valid, date: 2004-2-13,5:58:43.0

        STARTUP CONFIGURATION OPTIONS:

    F -- Set factory defaults
    N -- Use current non-volatile configuration
    P -- Use current non-volatile configuration,
         but reset passwords to factory defaults
    S -- Use configuration dated 2004-2-13,5:58:43.0 from SC FLASH
    E -- Use configuration dated 2004-2-13,5:58:43.0 from EM FLASH

Please enter your choice from the above list:
```

Figure 4.4 - *CellPath* 300 System Initialization Screen

Adding/Replacing Components

The fields in this display have the following meanings:

F   Resets all configuration parameters to their factory defaults, including passwords.

N   Loads the last configuration saved in the nonvolatile memory of the System Controller.

P   Loads the last configuration saved in the nonvolatile memory of the System Controller, except for passwords, which are reset to factory defaults.

S   Loads the last configuration saved in the FLASH memory of the System Controller.

E   Loads the last configuration saved in the FLASH memory of the Extension module.

Once the letter of the configuration option has been entered, the *CellPath* 300 prompts to reset DIP switch 3 to its default position of "down." This DIP switch must be reset in order for the *CellPath* 300 to continue the reboot procedure.

After the reboot, log into the *CellPath* 300 in the normal manner (see the *CellPath 300 ATM WAN Multiplexer Configuration Manual*).

4.4   Replacing the System Controller Module

Replacing the System Controller module requires that the *CellPath* 300 be powered down, then reboot it once the module is in place.

1.   Power down the *CellPath* 300 as described in Section 4.3.1.

CAUTION

Do not remove or insert the System Controller module while the chassis is receiving power.

2.   Remove the chassis front cover.

3.   Remove the current System Controller module from slot 1 at the front of the chassis by pressing the top ejector tab up towards the top and pressing the bottom black ejector tab down towards the bottom of the chassis until they are parallel with the front panel of the chassis. Using the tabs as a handle, pull the module straight out of the chassis.

4.   Install the new System Controller module in slot 1. Align the module's card edge with the top and bottom card guides in the chassis slot. Press the module into place until the edge connector snaps into the connector on the chassis midplane. The ejector tabs should be flush with the front panel of the chassis when the module is in place.

5.   Replace the chassis front cover as described in Section 4.2.2.

6.   Reboot the *CellPath* 300 as described in Section 4.3.3.

Adding/Replacing Components

4.5   Replacing the Extension Module

Replacing the Extension module requires that the *CellPath* 300 be powered down, then reboot it once the module is in place.

1. Power down the *CellPath* 300 as described in Section 4.3.1.

CAUTION

⚠

Do not remove or insert the Extension module while the chassis is receiving power.

2. If a card is installed in the PCMCIA Ethernet slot, detach the cable from the card, then remove the card from the slot.

3. Remove the current Extension module from slot 1 at the rear of the chassis. Use a small flat-blade screwdriver to loosen the screws at the top and bottom of the module face plate. Pull the module straight out.

4. Install the new Extension module in slot 1. Align the module's card edge with the top and bottom guides in the chassis slot. Press the module into place until the edge connector snaps into the connector on the chassis midplane. Tighten the two back-panel screws that hold the module face plate in place.

5. Reinstall the cable and card in the PCMCIA slot that were removed in Step 2 (if necessary).

6. Reboot the *CellPath* 300 as described in Section 4.3.3.

4.6   Installing Protocol Modules/Physical Layer Modules

Protocol modules (PMs) and physical layer modules (PLMs) are hot-swappable. It is not necessary to power down the *CellPath* 300 to remove or install one.

CAUTION ⚠	PMs and PLMs may boot up and appear to work properly, but do not pass data correctly if the modules are not fully inserted into the chassis. Always check to see that the modules are fully inserted if experiencing traffic problems.

4.6.1   Installing Protocol Modules (PMs)

Protocol modules belong in the chassis front card cage, in slots 2 through 8. To install a protocol module, use the procedures listed below.

CAUTION ⚠	Protocol modules may ONLY be installed in slots 2 through 8 of the front card cage. Slot 1 is reserved for the System Controller module.

1.   Remove the chassis front cover.

2.   If replacing a module, remove the old module from the slot. Open the ejector tabs at the top and bottom corners of the module. Pull the module straight out.

3.   Insert the new module. Align the module's card edge with the top and bottom card guides in the chassis slot. Press the module into place until the edge connector snaps into the connector on the chassis midplane. The ejector tabs should be flush when the module is in place.

4.   Replace the chassis front cover as described in Section 4.2.2.

4.6.2   Installing Physical Layer Modules (PLMs)

Physical layer modules are installed in the chassis rear card cage, slots 2 through 8. To install a physical layer module, use the procedures listed below.

CAUTION

Physical layer modules may ONLY be installed in slots 2 through 8 of the rear card cage. Slot 1 is reserved for the Extension module.

1. If adding a new module, remove the face plate from the rear slot where the module installed is to be installed. Use a small flat-blade screwdriver to loosen the screws at the top and bottom of the face plate.

WARNING!

Leave face plates installed on empty rear-panel slots during normal operation to ensure adherence to EMI, ESD, and safety standards.

2. If replacing an existing module, remove that module from the slot. Use a small flat-blade screwdriver to loosen the screws at the top and bottom of the module, then pull the module straight out.

3. Install the new module. Align the module's card edge with the top and bottom guides in the chassis slot. Press the module into place until the edge connector snaps into the connector on the chassis midplane. Replace the two back-panel screws that hold the module face plate in place.

4.6.3   Reconfiguring the Port and Connections

Protocol modules are paired to physical layer modules. The protocol module installs in a slot at the front of the chassis, the physical layer module installs in the matching slot at the rear of the chassis. See the *CellPath 300 ATM WAN Multiplexer User's Manual* for a listing of acceptable protocol and physical layer module pairings.

If adding a new protocol and physical layer module pair, install the modules in either order. When both modules are installed, verify their installation by looking at the *CellPath* 300 System Configuration screen. The new modules are listed at the bottom of the screen.

If replacing an existing protocol or physical layer module with a new one of the same type, simply remove the old module and install the new one. The previous port configuration and VPI/VCI connections are applied to the new module automatically.

```
┌─────────────────────────────────────────────────────────────────────┐ ▲
│               ┌──CellPath 300 System Configuration──┐                 │
│                                                       [ Events... ]   │
│     System Name:           Unit -2                                    │
│     System Location:       ITG WAN lab                                │
│     System Date:           13-Jun-1997 10:05:49                       │
│     Software Version:      1.25(10) 1997-6-3,16:32:38.0               │
│     System Clock Source:   1:1 Internal               [ Secondary ]   │
│     PCMCIA Slot:           Empty                                      │
│     Power Supplies: (Upper) UNKNOWN   (Lower) UNKNOWN    Fan(s): OK    │
│                                                                        │
│     [ System Admin... ]       [ SNMP & TCP/IP... ]     [ Utilities... ]│
│     [ Connections... ]                                 [ Logout ]      │
│                                                                        │
│     Slot 1 F 10010 SC                    ( ) R 10020 EM               │
│     Slot 2 F ! Removed 10200 Cell PM     ( ) R                        │
│     Slot 3 F 10200 Cell PM               ( ) R 10304 OC3c/STM1 MM PLM  │
│     Slot 4 F 10203 Quad Pkt/CBR PM       ( ) R 10303 Tri V.35/530 & DSX-1 PLM│
│     Slot 5 F 10203 Quad Pkt/CBR PM       ( ) R 10302 Quad DSX-1 PLM   │
│     Slot 6 F ! PM Configuration Mismatch ( ) R ! PLM Configuration Mismatch│
│     Slot 7 F 10201 Packet PM             ( ) R 10301 HSSI PLM         │
│     Slot 8 F ! Invalid PM/PLM Combination ( ) R ! Invalid PM/PLM Combination│
│                                                                        │
├─────────────────────────────────────────────────────────────────────┤ │
│  System Administration Functions                                      │ ▼
└─────────────────────────────────────────────────────────────────────┘
```

Figure 4.5 - *CellPath* 300 System Configuration Screen w/Errors

4.6.3.1 ! Removed PM/PLM Information

If a PM or PLM is removed and not replaced with a compatible module, the appropriate position on the module display of the System Configuration screen (Figure 4.5) remains empty. Moving to the empty module position and pressing the <ENTER> key displays the informational message shown in Figure 4.6.
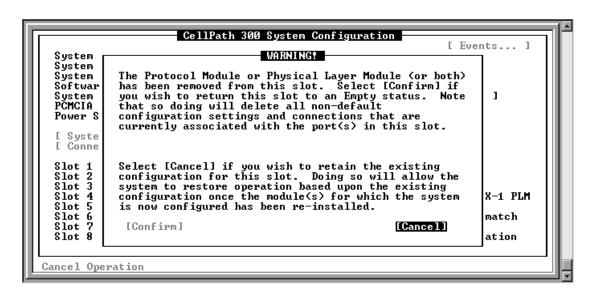
Figure 4.6 - ! Removed PM Error Screen

4.6.3.2   ! PM/PLM Configuration Mismatch

If replacing an existing module with a new one of a different type (but one that is compatible with the paired protocol or physical layer module), the message "! PM (PLM) Configuration Mismatch" appears (Figure 4.5) in the module slot locations on the *CellPath* 300 System Con-figuration screen. Tab to the slot location and press <ENTER>, a screen appears (Figure 4.7) confirming if the previous configuration and connections are to be deleted. If the previous settings are not to be deleted, remove the new protocol or physical layer module and replace it with the same type as before.
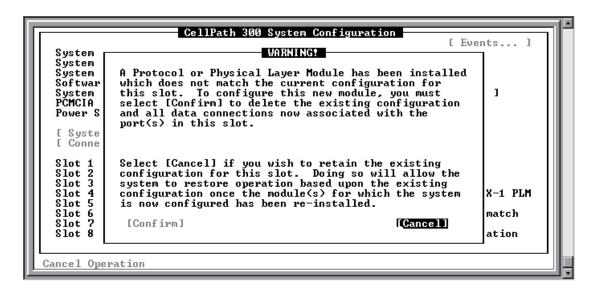
Figure 4.7 - ! PM ⁄ PLM Configuration Mismatch Error Screen

4.6.3.3 ! Invalid PM/PLM Combination

If replacing an existing module with a new one that is not compatible with its paired module, the message "! Invalid PM/PLM Combination" appears in the protocol module slot location on the *CellPath* 300 System Configuration screen (Figure 4.5). Moving to the module information and pressing the <ENTER> key displays the informational message shown in Figure 4.8. Replace the module with one that is compatible with the paired module.
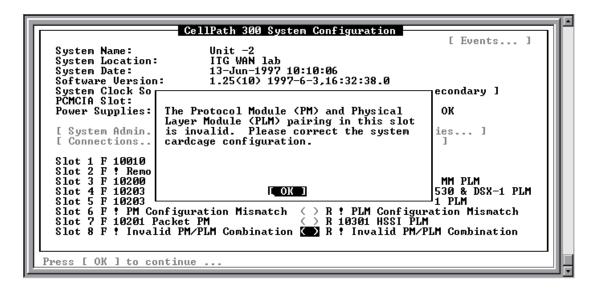
Figure 4.8 - ! Invalid PM/PLM Combination Error Screen

4.6.4   Deleting a Module Pair's Connections

If a module pair is removed, delete the connections associated with the ports on those modules in order to free-up the slot for other modules. To do this, use the *CellPath* 300 `System Configuration` screen. The message "! Removed *module*" appears in the slot locations of the modules that were removed. Tab to the physical layer slot location and press `<ENTER>`. A screen appears allowing the port connections and configuration parameters to be deleted. Once a module pair's connection has been deleted, the slot in which the modules resided is shown as "Empty" on the `System Configuration` screen.

Adding/Replacing Components

4.7   Installing a Power Supply

Power supplies are hot-swappable in that the *CellPath* 300 can be receiving power from one power supply while the second power supply is removed or when installing a second power supply, or while applying or remove power to the second power supply.

WARNING!

To avoid the hazard of electrical shock, never install or remove a power supply that is connected to a power source and receiving power. High voltages may be present.

WARNING!

Leave face plates installed on empty rear-panel slots during normal operation to ensure adherence to EMI, ESD, and safety standards.

If there is only have one power supply and that supply fails, replace the supply and then reboot the system. If the supply is failing but is still providing power, it is recommended that a new power supply be installed in the vacant power supply slot and connect it to a power source before removing the first power supply. Installing a second supply avoids having to power down the *CellPath* 300.

To install a power supply, perform the following steps:

1. If only one power supply is installed and being replaced, power down the *CellPath* 300 as described in Section 4.3.1. Otherwise, leave the *CellPath* 300 running.

2. Detach the power cord from the power supply being removed.

3. Remove the power supply from the chassis. Use a small flat-blade screwdriver to loosen the two screws at the top and bottom of the supply. Pull the supply straight out from the chassis.

4. Install the new power supply. Align the supply with the top and bottom guides in the chassis slot. Press the supply into place until the edge connector snaps into the connector on the chassis midplane. Tighten the two screws that hold the supply in place.

5. If the new power supply is the only power supply in the unit, reboot the *CellPath* 300 as described in Section 4.3.3. If the new power supply is a second supply, simply plug in the power cord.

4.8   Installing an Ethernet PCMCIA Card

Telnet to the *CellPath* 300 via an Ethernet LAN connection. The chassis provides a PCMCIA card slot on the rear panel. The Ethernet PCMCIA Adapter Card is an optional accessory. It comes with a PCMCIA card and the required cable. The cable has a proprietary connector on the card end and a 10BaseT connector on the far end.

The procedure for installing an Ethernet Adapter card is as follows:

1.   Plug the cable into the PCMCIA card.

2.   Plug the card into the PCMCIA slot on the *CellPath* 300 rear panel.

3.   Connect the cable's 10BaseT connector to a 10BaseT wiring hub directly or through Ethernet cabling.

Additional instruction as required may be supplied with the accessory package.

NOTE   Ensure that the cable to the Ethernet card is securely connected. If the cable becomes loose, the network connection may be lost. To secure the connection, permanently affix the Ethernet cable to the Extension module.

NOTE   If the Ethernet card in the PCMCIA interface must be changed with a new or different Ethernet card, the ARP cache entries for the *CellPath* 300 Ethernet MAC address in the host(s) attempting to communicate with the *CellPath* 300 must be flushed. Most host systems (typically) flush the aged ARP cache entries automatically. It is common for this to occur after a time-out of between 5 and 20 minutes, depending upon timing parameters set within each system host.

Adding/Replacing Components

CHAPTER 5   **Performance Monitoring**

This chapter provides procedures on how to access and interpret the statistics on each port for performance monitoring purposes. After a brief introduction, the statistics screens are covered in the following order:

5.1 Introduction to Performance Monitoring

The *CellPath* 300 has comprehensive reporting facilities that allow monitoring of what is going on with the network. These facilities are accessed through port statistics screens.

5.1.1 Port Statistics Screens

The *CellPath* 300 port statistics screens are a fundamental tool for monitoring system performance. They include the following:

- Physical layer screens, which provide information on physical media performance (e.g., OC-3c, DS3, E3, J2, DSX-1, E1, etc.)
- Protocol layer screens, which provide information on protocol-level performance (e.g., ATM UNI, ATM DXI, Frame Relay UNI, CBR, etc.)

5.1.2 Accessing Port Statistics Screens

Access statistics screens from either of two places in the user interface:

- From a port configuration screen, for single-port modules
- From a port selection screen, for multiport modules

Buttons to access port statistics screens appear in pairs; for example,

```
[CBR Stats...]
[DSX-1 Stats...]
```

where the top button accesses protocol-level statistics, and the bottom button accesses physical-layer statistics.

5.1.3 Specifying Time Intervals

The *CellPath* 300 divides time into intervals, as follows:

- The last 24 hours are divided into intervals of 15 minutes each.
- The current 15-minute interval is numbered 0. The 15-minute interval of 24 hours ago is numbered 96.
- If the system has been up for less than 24 hours, or the card slot has been populated for less than 24 hours, the number of available intervals is less than 96.
- Statistics displayed in screens are updated when the [^Update] button is selected and the <ENTER> key is pressed.

NOTE If a 15-minute interval boundary has been crossed since the last update, the counts displayed on the statistics screen may go down.

By default, the screens display statistics for the current 15-minute interval and the totals for the previous 24 hours or maximum number of available intervals. To view the statistics for a different interval than the current one, advance the cursor to the Interval field using the `<Tab>` key or the cursor movement keys, type the number of the interval to view, then press the `<ENTER>` key.

5.1.4 Event Counts

The events counted in the statistics screens are stored in SNMP variables. Totals displayed in statistics screens do not include events occurring in the current interval; they only include counts from interval 1 through the highest available numbered interval.

The `[Zero  Stats]` button that appears on port statistics screens causes all statistical counters on that screen to be set to zero, including all interval counts and totals associated with the port.

5.1.5 Port Status Messages

A `Port Status` field appears in the upper-left corner of each performance monitoring screen. Port status fields summarize the status of the port. Specifically, the `Port Status` field lets displays any alarm conditions on a port.

While performance monitoring screens display error counts for a given layer only (e.g., physical layer or protocol layer), the `Port Status` field follows this rule: If a physical layer alarm exists on a port, it is displayed regardless of whether the statistics screen is a physical-layer or protocol-layer screen. For example, if an OC-3c port is configured to carry ATM UNI traffic and an OC-3c fault exists on the port, the OC-3c status message is displayed even if the `ATM UNI statistics` screen is being examined. Any ATM UNI status messages would not be displayed until the OC-3c alarms have been cleared.

Status messages take the following form:

        identifier message[,message...]

which means that a sequence of characters identifying the source of the alarm is followed by one or more alarm messages, separated by commas. For example, the following port status message:

        `DSX-1 LOF,LOS`

indicates that a DSX-1 port is experiencing a near-end loss of frame and a near-end loss of signal condition.

When no error conditions exist on a port, its status message reads OK. Table 5.1 lists the status messages that can appear in statistics screens when error conditions are found.

Table 5.1 - *CellPath* 300 Status Messages

Identifier	Message	Meaning
OC-3c	LOS	Section layer loss of signal
	LOF	Section layer loss of frame
	Line AIS	Line layer alarm indication signal
	Line RDI	Line layer remote defect indication
	Path LOP	Path layer loss of pointer
	Path AIS	Path layer alarm indication signal
	Path SLM	Path layer signal label mismatch
	Path RDI	Path layer remote defect indication
DS3	Rx-RAI	Far-end sending remote alarm indication (RAI)
	Tx-RAI	Near-end sending remote alarm indication (RAI)
	Rx-AIS	Far-end sending alarm indication signal (AIS)
	Tx-AIS	Near-end sending alarm indication signal (AIS)
	LOF	Near-end loss of frame
	LOS	Near-end loss of signal
	Loopbk	Near-end is looped
	Rx-Test	Near-end detects a test code
	Other	Far-end DS3 service-affecting equipment failure reported via FEAC channel
E3	Rx-RAI	Far-end sending remote alarm indication (RAI)
	Tx-RAI	Near-end sending remote alarm indication (RAI)
	Rx-AIS	Far-end sending alarm indication signal (AIS)
	Tx-AIS	Near-end sending alarm indication signal (AIS)
	LOF	Near-end loss of frame
	LOS	Near-end loss of signal
	Loopbk	Near-end is looped
J2	Rx-RAI	Far-end sending remote alarm indication (RAI)
	Tx-RAI	Near-end sending remote alarm indication (RAI)
	Rx-AIS	Far-end sending alarm indication signal (AIS)
	Tx-AIS	Near-end sending alarm indication signal (AIS)
	LOF	Near-end loss of frame
	LOS	Near-end loss of signal
	Loopbk	Near-end is in loopback
	LOQ	Loss of line quality
	Rx-PAIS	Far-end sending payload AIS
	Tx-PAIS	Near-end sending payload AIS
	Other	Other failure (unspecified

Table 5.1 - *CellPath* 300 Status Messages

Identifier	Message	Meaning
DSX-1	Rx-RAI TxRAI Rx-AIS Tx-AIS LOF LOS Loopbk	Far-end loss of frame (i.e., yellow alarm) Near-end sending loss of frame indication Far-end sending alarm indication signal (AIS) Near-end sending alarm indication signal (AIS) Near-end loss of frame Near-end loss of signal Near-end is looped
E1	Rx-RAI TxRAI Rx-AIS Tx-AIS LOF LOS Loopbk T16-AIS Rx-T16RAI Tx-T16RAI	Far-end loss of frame (i.e., yellow alarm) Near-end sending loss of frame indication Far-end sending alarm indication signal (AIS) Near-end sending alarm indication signal (AIS) Near-end loss of frame Near-end loss of signal Near-end is looped Far-end sending Time Slot 16 All Ones AIS Far-end sending Time Slot 16 Loss of Multiframe Near-end sending Time Slot 16 Loss of Multi-frame
V.35/EIA-530	LOS LOC DTE-Line-LB Local-LB	Loss of signal Loss of clock DTE line loopback is set Local loopback is set
HSSI	LOS LOC DTE-Line-LB Local-LB	Loss of signal Loss of clock DTE line loopback is set Local loopback is set
CBR	InFIFO Overflow OutFIFO Underflow OutFIFO Overflow	Input FIFO overflow Output FIFO underflow Output FIFO overflow
Cell	PLCP OOF PLCP Yellow Alarm HEC OCD CBR In FIFO Overflow CBR Out FIFO Over-flow	PLCP out of frame Far-end sending PLCP yellow alarm HEC out of cell delineation CBR input FIFO overflow CBR output FIFO overflow
VBR	Packet Input Buffer Overflow	VBR input buffer overflow

Table 5.1 - *CellPath* 300 Status Messages

Identifier	Message	Meaning
IMA Group Status	Active	The group has been configured and has no error conditions
	ACP timeout	Timeout due to the non-arrival of an ACP cell
	Bandwidth failure	Group bandwidth fell below a certain threshold due to loss of links from the group
	Signal failure	A configuration mismatch or non-arrival of LCP cells during the setup of a group
	Differential delay exceeded	Exceeded the allowable number of milliseconds of delay differential among the component T1/E1 links currently in use by the IMA group.
	Arbitration failure	IMA group fails to establish a group ID and connection in 10 attempts
IMA Link Status	OK	The interface is operating normally with no alarm or errored status conditions present for any link in the group
	Errors	Intermittent error status conditions or transient internal errors
	Alarms	One or more alarm conditions present on this interface
	Link(s) x:x	The links or links experiencing errors or alarms are identified
Status	Active	This link is currently included in the IMA group
	Disabled	This link has been disabled by the user
	Out of LDS	Indicates that a link is not in Link Delay Sync or that a good LCP cell is received but is not in the right position within the frame

5.2   OC-3c Port Statistics

The `OC-3c Statistics` screen reports on the operational status of any OC-3c port in the
CellPath 300 system.

5.2.1   Accessing the Screen

To view the `OC-3c Statistics` screen, highlight the `[OC-3 Stats...]` button on the
`Cell/OC-3c Port Configuration` screen, then press the `<ENTER>` key.

```
┌──────────────────────── OC-3 Statistics - Port 3:1 ────────────────────────┐
│ Layer    Section   Line   Path      Signal                    [ Events... ] │
│ Status:                             Label:                                  │
│                                                                             │
│                    - Interval  0 of  3 -   ------- Total --------           │
│                    Near End    Far End     Near End    Far End              │
│ Section CUs:            0                       0                           │
│ Section ESs:           25                    2072                           │
│ Section SESs:          25                    2072                           │
│ Section SEFSs:         25                    2072                           │
│                                                                             │
│ Line CUs:               0          0            0         0                 │
│ Line ESs:               0          0            0         0                 │
│ Line SESs:              0          0            0         0                 │
│ Line UASs:              0          0            0         0                 │
│                                                                             │
│ Path CUs:               0          0            0         0                 │
│ Path ESs:               0          0            0         0                 │
│ Path SESs:              0          0            0         0                 │
│ Path UASs:              0          0            0         0                 │
│                                                                             │
│ Max. interval table size: 96        [ Zero Stats ]   [ ^Update ]  [ ^OK ]  │
├─────────────────────────────────────────────────────────────────────────────┤
│ Update this screen                                                          │
└─────────────────────────────────────────────────────────────────────────────┘
```

Figure 5.1 - OC-3c Statistics Screen

NOTE ➡   Due to the 32-bit limitation on the SNMPv1 MIB
integers, the cell statistics count saturate in less
than 24 hours on OC-3/STM1 cell ports if the
ports run at full data rates continuously. On an
OC-3/STM1 port with data passing at full
bandwidth, the totals counters become saturated
in about four hours. It is still possible to obtain
good totals by using an external SNMP manager
to read out each of the valid 15-minute intervals
and sum the values.

5.2.2   Screen Description

The following fields appear on the OC-3c Statistics screens:

Layer Status (Section)	Status of the interface (section) to which the port belongs. This is a read-only field. See Section 5.1.5 for more information about the possible contents of this field.
Layer Status (Line)	Status of the interface (line) to which the port belongs. This is a read-only field. See Section 5.1.5 for more information about the possible contents of this field.
Layer Status (Path)	Status of the interface (path) to which the port belongs. This is a read-only field. See Section 5.1.5 for more information about the possible contents of this field.
Signal Label	Current value of the received path signal label. Under normal conditions, this value is 13 (hexadecimal), denoting an ATM circuit. For compatibility with older equipment, a value of 1 (generic nonspecific) is also acceptable. All other values signify a signal label mismatch (SLM) error. If this path is not provisioned, the signal label value is 0. Note that this field is valid only if there are no errors in the layer status values, or if the Path status is UEQ (unequipped or unprovisioned) or SLM.
Section CVs	Number of Coding Violations (section BIP-8 defects) reported for the OC-3 section to which the port belongs. Coding violations are Bit Interleaved Parity errors detected in the B1 byte of the incoming signal's section overhead.
Section ESs	Number of Errored Seconds reported for the OC-3c section to which the port belongs. A section Errored Second is a second with one or more coding violations or incoming defects (LOS or SEF) occurring at the section level.
Section SESs	Number of Severely Errored Seconds reported for the OC-3c section to which the port belongs. A section Severely Errored Second is a second in which 2500 or more section code violations occur, or in which at least one incoming defect has occurred at the section level.

Section SEFSs   Number of Severely Errored Framing Seconds reported for the OC-3c section to which the port belongs. A Severely Errored Framing Second is a second containing one or more severely errored framing (SEF) defects. A severely errored framing (SEF) defect or Out of Frame (OOF) event is the occurrence of four contiguous errored frame alignment words. A frame alignment word occupies the A1 and A2 bytes of an STS frame.

Line CVs   Number of Coding Violations reported for the OC-3c line to which the port belongs. Coding violations are Bit Interleaved Parity (BIP) errors detected in the incoming signal. The near end figure gives the number of BIP-24 defects found in the B2 bytes of STS line overhead. The far end figure gives the number of FEBE defects found in the Z2 byte of the line overhead.

Line ESs   Number of Errored Seconds reported for the OC-3c line to which the port belongs. A line Errored Second is a second with one or more coding violations or incoming defects (AIS for the near end, RDI for the far end) occurring at the line level.

Line SESs   Number of Severely Errored Seconds reported for the OC-3c line to which the port belongs. A line Severely Errored Second is a second in which 2500 or more line code violations occur, or in which at least one incoming defect (AIS for the near end, RDI for the far end) has occurred at the line level.

Line UASs   Number of Unavailable Seconds reported for the OC-3c line to which the port belongs. The line is considered unavailable from the onset of 10 consecutive severely errored seconds.

Path CVs   Number of Coding Violations reported for the OC-3c (end-to-end) path to which the port belongs. Coding violations are Bit Interleaved Parity (BIP) errors detected in the incoming signal. Near End gives the number of BIP-8 defects found in the B3 byte of the STS path overhead. Far End gives the number of FEBE defects found in the G1 STS Path Status Byte.

Path ESs	Number of Errored Seconds reported for the OC-3c (end-to-end) path to which the port belongs. A path Errored Second is a second with one or more coding violations or incoming defects (`AIS, LOP,` or `SLM` for the near end, `RDI` for the far end) occurring at the path level.
Path SESs	Number of Severely Errored Seconds reported for the OC-3c (end-to-end) path to which the port belongs. A path Severely Errored Second is a second in which 2400 or more path code violations occur, or in which at least one incoming defect (`AIS, LOP,` or `SLM` for the near end, RDI for the far end) has occurred at the path level.
Path UASs	Number of UnAvailable Seconds reported for the OC-3c (end-to-end) path to which the port belongs. The path is considered unavailable from the onset of 10 consecutive severely errored seconds for that path.
Max Intervals	Number of 15-minute intervals available for display. Although the system always maintains up to 96 intervals in its history log, setting this field to a lower value makes only those intervals from 1 to the field value available. This is most useful in conjunction with an SNMP network manager that "walks" the interval table. The default value for this field is 32, but it may be set to any value in the range 4 to 96, inclusive.

5.2.3   Events and Conditions

The following events and conditions are used in making up the counts displayed in the `OC-3c Statistics` screen:

AIS	Occurs when the *CellPath* 300 detects an alarm indication signal being sent by an upstream device.
FEBE	Indicates that the far end has detected errors in the last frame it received.
LOP	Occurs when the *CellPath* 300 cannot detect the payload pointer in the OC-3c/STM1 signal.
LOS	Occurs when the *CellPath* 300 cannot detect a signal at a configured port.

LOF   Occurrence of a particular density of framing error events. A framing error is the absence of an expected delimiter at the beginning or a frame.

RDI   Indicates that the far end has lost the signal coming to it from the *CellPath* 300 (i.e., a loss of signal or a loss of pointer has occurred).

SEF   Declared when the bit errors in a frame exceed a threshold value.

SLM   Declared when the Signal Label indicates that the information in the payload is not ATM data.

5.3 DS3 Port Statistics

The DS3 Statistics screen reports on the operational status of any DS3 port in the *CellPath* 300 system.

5.3.1 Accessing the Screen

To view the DS3 Statistics screen, highlight the [DS3 Stats...] button on the Cell/ DS3 Port Configuration screen, then press the <ENTER> key.

```
┌──────────────────── DS3 Statistics - Port 3:1 ────────────────────┐
│                                                    NEW [ Events... ] │
│ Port Status: DS3 Tx-RAI,LOS                                         │
│                                                                     │
│                  - Interval  0 of  4 -    ------- Total --------    │
│                   Near End     Far End     Near End     Far End     │
│ DS3 SEFSs:            0                        0                     │
│ DS3 UASs:           765           0          128           0        │
│                                                                     │
│ Line CVs:         65535                     65535                    │
│ Line ESs:             3                         3                    │
│                                                                     │
│ P-bit CVs:            0                         0                    │
│ P-bit ESs:            0                         0                    │
│ P-bit SESs:          10                         0                    │
│                                                                     │
│ C-bit CVs:            0           0             0           0        │
│ C-bit ESs:            0           0             0           0        │
│ C-bit SESs:          0           0             0           0        │
│                                                                     │
│ [ Zero Stats ]                            [ ^Update ]   [ ^OK ]     │
├─────────────────────────────────────────────────────────────────────┤
│ Update DS3 statistics                                               │
└─────────────────────────────────────────────────────────────────────┘
```

Figure 5.2 - DS3 Statistics Screen

5.3.2 Screen Description

The following fields appear on the DS3 Statistics screen:

Port Status	Status of the DS3 port. This field can contain status messages related to either the physical layer module or the protocol module used by this port. See Section 5.1.5 for more information about the possible contents of this field.

DS3 SEFSs   Number of DS3 Severely Errored Framing Seconds. A severely errored framing second is a second with one or more out of frame (OOF) defects or incoming AISs.

DS3 UASs   Number of DS3 Unavailable Seconds. An Unavailable Second (UAS) is a second during which the port is unable to transmit or receive traffic. The DS3 port is said to be unavailable from the onset of 10 contiguous P-bit Severely Errored Seconds (PSESs), or from the onset of the condition leading to a failure. If the condition leading to a failure was immediately preceded by one or more contiguous PSESs, then the UAS count starts at the beginning of these PSESs.

Once unavailable, and if no failure is present, the DS3 port becomes available at the onset of 10 contiguous seconds with no PSESs.

Once unavailable, and if a failure is present, the DS3 port becomes available at the onset of 10 contiguous seconds with no PSESs, if the failure clearing time is less than or equal to 10 seconds. If the failure clearing time is more than 10 seconds, the DS3 port becomes available at the onset of 10 contiguous seconds with no PSESs, or the period leading to the successful clearing of the failure, whichever occurs later.

While the port is unavailable, the only performance statistics counter incremented is the count of unavailable seconds.

Line CVs   Number of Line Coding Violations (LCVs). For DS3 ports, an LCV is either a bipolar violation event or an excessive zeros event. A bipolar violation for a B3ZS-coded signal is the occurrence of a pulse of the same polarity as the previous pulse, when that pulse is not part of the zero substitution code. An excessive zeros event for a B3ZS-coded signal is the occurrence of three or more consecutive zeros.

Line ESs   Number of Line Errored Seconds. A line errored second is a second in which one or more coding violations OR one or more loss of signal defects occurred.

P-bit CVs	Number of P-bit Coding Violations (PCVs). For all DS3 applications, a CV error event is a P-bit parity error event. A P-bit parity error event is the occurrence of a received P-bit code on the DS3 M-frame that is not identical to the corresponding locally calculated code.
P-bit ESs	Number of P-bit Errored Seconds. A PES is a second with one or more PCVs OR one or more OOF defects or incoming AISs. This counter is not incremented when UASs are counted. An AIS occurs when the *CellPath* 300 detects an alarm indication signal being sent by an upstream device.
P-bit SESs	Number of P-bit Severely Errored Seconds. A PSES is a second with 44 or more PCVs OR one or more out of frame defects or incoming AISs. This counter is not incremented when UASs are counted.
C-bit CVs	Number of C-bit Coding Violations (CCVs). For C-bit parity DS3 applications, this is the count of C-bit parity errors occurring during the accumulation interval.
C-bit ESs	Number of C-bit Errored Seconds. A C-bit errored second is a second with one or more CCVs OR one or more out of frame defects or incoming AISs. This counter is not incremented when UASs are counted.
C-bit SESs	Number of C-bit Severely Errored Seconds. A C-bit severely errored second is a second with 44 or more CCVs OR one or more out of frame defects or incoming AISs. This counter is not incremented when UASs are counted.

5.4 E3 Port Statistics

The E3 Statistics screen reports on the operational status of any E3 port in the *CellPath* 300 system.

5.4.1 Accessing the Screen

To view the E3 Statistics screen, highlight the [E3 Stats...] button on the Cell/E3 Port Configuration screen, then press the <ENTER> key.

.

```
┌─────────────────── E3 Statistics - Port 3:1 ───────────────────┐
│                                                NEW [ Events... ] │
│  Port Status: E3 Tx-RAI,LOS                                      │
│                                                                  │
│                    - Interval  0 of  0 -  ------- Total -------- │
│                    Near End    Far End    Near End    Far End    │
│  E3 SEFSs:              0                      0                  │
│  E3 UASs:              14                      0                  │
│                                                                  │
│  Line CVs:          65535                      0                  │
│  Line ESs:              3                      0                  │
│                                                                  │
│  G.832 BIP-8s:          0                      0                  │
│  G.832 FEBEs:                     1902                        0   │
│                                                                  │
│                                                                  │
│                                                                  │
│                                                                  │
│  [ Zero Stats ]                           [ ^Update ]  [ ^OK ]   │
│  Update E3 statistics                                            │
└──────────────────────────────────────────────────────────────────┘
```
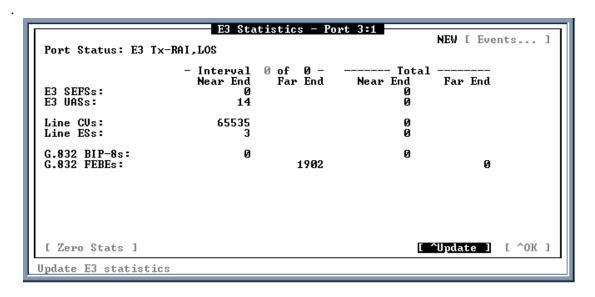
Figure 5.3 - E3 Statistics Screen

5.4.2 Screen Description

The following fields appear on the E3 Statistics screen:

> **Port Status**   Status of the E3 port. This field can contain status messages related to either the physical layer module or the protocol module used by this port. See Section 5.1.5 for more information about the possible contents of this field.

E3 SEFSs	Number of E3 Severely Errored Framing Seconds. A severely errored framing second is a second with one or more out of frame defects or incoming AISs. An AIS (Alarm Indication Signal) defect occurs when the *CellPath* 300 detects an alarm indication signal being sent by an upstream device.
E3 UASs	Number of E3 Unavailable Seconds. An unavailable second (UAS) is a second during which the port is unable to transmit or receive traffic. The E3 port is said to be unavailable from the onset of 10 contiguous PSESs, or from the onset of the condition leading to a failure. If the condition leading to the failure was immediately preceded by one or more contiguous PSESs, then the UAS count starts at the beginning of these PSESs.
Line CVs	Number of Line Coding Violations. For E3 ports, a line coding violation is synonymous with a bipolar violation. A bipolar violation for an HDB3-coded signal is the occurrence of a pulse of the same polarity as the previous pulse, when that pulse is not part of the zero substitution code.
Line ESs	Number of Line Errored Seconds. A line errored second is a second in which one or more coding violations OR one or more loss of signal defects occurred.
G.832 BIP-8s	Number of G.832 Bit Interleaved Parity-8 errors for the interval.
G.832 FEBEs	Number of G.832 Far End Block Errors for the interval.

5.5 J2 Port Statistics

The J2 Statistics screen reports on the operational status of any J2 port in the *CellPath* 300 system.

5.5.1 Accessing the Screen

To view the J2 Statistics screen, highlight the [J2 Stats...] button on the Cell/J2 Port Configuration screen, then press the <ENTER> key.

```
┌──────────────────── J2 Statistics - Port 3:1 ────────────────────┐
│                                                   NEW [ Events... ]│
│  Port Status: OK                                                   │
│                       - Interval  0 of  0 -   ------- Total -------│
│                         Near End                 Near End          │
│  J2 UASs:                  0                        0              │
│  J2 SEFs:                  0                        0              │
│  J2 ESs:                   0                        0              │
│  J2 SESs:                  0                        0              │
│                                                                    │
│  J2 Line CVs:              0                        0              │
│  J2 Line ESs:              0                        0              │
│                                                                    │
│  J2 Framing Errs:          0                        0              │
│  J2 CRC-5 Errs:            0                        0              │
│                                                                    │
│                                                                    │
│  [ Zero Stats ]                          [ ^Update ]   [ ^OK ]     │
│  Update J2 statistics                                              │
└────────────────────────────────────────────────────────────────────┘
```

Figure 5.4 - J2 Statistics Screen

5.5.2 Screen Description

The following fields appear on the J2 Statistics screen.

Port Status	Status of the J2 port. This field can contain status messages related to either the physical layer module or the protocol module used by this port.
J2 UASs	Number of J2 Unavailable Seconds. An unavailable second (UAS) is a second during which the port is unable to transmit or receive traffic. The J2 port is said to be unavailable from the onset of 10

contiguous SESs, or from the onset of the condition leading to a failure. If the condition leading to the failure was immediately preceded by one or more contiguous SESs, then the UAS count starts at the beginning of these SESs.

Once unavailable, and if no failure is present, the J2 port becomes available at the onset of 10 contiguous seconds with no SESs.

Once unavailable, and if a failure is present, the J2 port becomes available at the onset of 10 contiguous seconds with no SESs, if the failure clearing time is less than or equal to 10 seconds. If the failure clearing time is more than 10 seconds, the J2 port becomes available at the onset of 10 contiguous seconds with no SESs, or the period leading to the successful clearing of the failure, whichever occurs later.

While the port is unavailable, the only performance statistics counter incremented is the count of unavailable seconds.

J2 SEFSs Number of J2 Severely Errored Framing Seconds. A severely errored framing second is a second with one or more out of frame defects or an incoming AIS. An AIS (Alarm Indication Signal) defect occurs when the *CellPath* 300 detects an alarm indication signal being sent by an upstream device.

J2 ES Number of Errored Seconds (ES) for the J2 port. An errored second is a second with one or more (but no more than six) CRC-5 errors OR one or more out of frame defects OR one or more loss of line quality defects OR a detected AIS. Loss of line quality may occur when the rate of bit errors exceeds 10^{-6}.

J2 SES Number of Severely Errored Seconds (SES) for the J2 port. A severely errored second is a second with six or more CRC-5 errors OR one or more out of frame defects OR one or more loss of line quality defects OR a detected AIS defect.

Line CVs Number of Line Coding Violations. For J2 ports, a line coding violation is synonymous with a bipolar violation. A bipolar violation for a B8ZS-coded signal is the occurrence of a pulse of the same polarity as the previous pulse, when that pulse is not part of the

zero substitution code.

Line ESs   Number of Line Errored Seconds. A line errored second is a second in which one or more line coding violations OR one or more loss of signal defects occurred.

J2 Framing Errors   Number of Framing Errors. A framing error is the absence of an expected delimiter at the beginning or end of a frame.

CRC-5 Errors   Number of CRC-5 Errors. One CRC-5 error is counted for every multiframe that has one or more CRC-5 defects.

5.6   DSX-1 Port Statistics

The DSX-1 Statistics screen reports on the operational status of any DSX-1 port in the *CellPath* 300 system.

5.6.1   Accessing the Screen

To view the DSX-1 Statistics screen, highlight the [DSX1 Stats...] button for the appropriate port on the Quad DSX-1 Port Selection screen or Tri V.35 & DSX-1 Port Selection screen, then press the <ENTER> key.

```
┌──────────────── DSX-1 Statistics - Port 2:1 ────────────────┐
│                                                 [ Events... ]│
│  Port Status: DSX-1 Tx-RAI,LOS                               │
│                                                              │
│                   - Interval  0 of  0 -   ------- Total ------│
│                      Near End                Near End        │
│  DSX-1 ESs:              0                       0           │
│  DSX-1 SESs:             0                       0           │
│  DSX-1 SEFSs:            0                       0           │
│  DSX-1 UASs:            47                       0           │
│                                                              │
│  Line CVs:               0                       0           │
│  Line ESs:               0                       0           │
│                                                              │
│  Path CVs:               0                       0           │
│  Ctrl Slip Secs:         0                       0           │
│  Bursty ESs:             0                       0           │
│  Degraded Mins:          0                       0           │
│                                                              │
│                                                              │
│  [ Zero Stats ]                        [ ^Update ]  [ ^OK ]  │
│ Update DSX-1 statistics                                      │
└──────────────────────────────────────────────────────────────┘
```
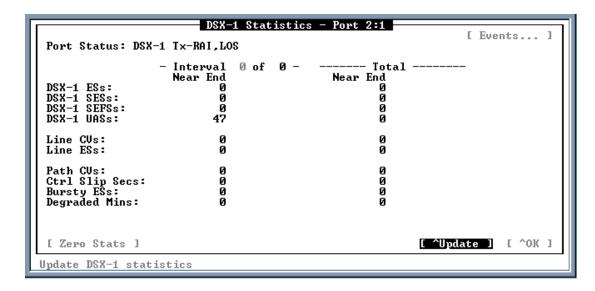
Figure 5.5 - DSX-1 Statistics Screen

5.6.2   Screen Description

The following fields appear on the DSX-1 Statistics screen.

Port Status Status of the DSX-1 port. This field can contain status messages related to either the physical layer module or the protocol module used by this port. See Section 5.1.5 for more information about the possible contents of this field.

DSX-1 ES　Number of Errored Seconds (ES) for the DSX-1 port. For ESF links, an errored second contains one or more path code violations OR one or more out of frame defects OR one or more controlled slip events OR a detected AIS defect. For D4 links, line code violations also trigger an errored second. The DSX-1 ES count is not incremented during an unavailable second.

DSX-1 SESs　Number of Severely Errored Seconds (SES) for the DSX-1 port. For ESF signals, a severely errored second contains 320 or more path code violations OR one or more out of frame or AIS defects. For D4 signals, a severely errored second contains 1544 or more line code violations, OR one or more framing error events or out of frame defects. Controlled slips are not included in determining the number of DSX-1 severely errored seconds. DSX-1 SESs are not incremented during an unavailable second.

DSX-1 SEFs　Number of Severely Errored Framing Seconds (SEF) for the DSX-1 port. A severely errored framing second is a second with one or more out of frame or AIS defects.

DSX-1 UASs　Number of Unavailable Seconds (UAS) for the DSX-1 port. An unavailable second (UAS) is a second during which the port is unable to transmit or receive traffic. The DSX-1 port is said to be unavailable from the onset of 10 contiguous SESs, or from the onset of the condition leading to a failure. If the condition leading to the failure was immediately preceded by one or more contiguous SESs, then the UAS count starts at the beginning of these SESs.

Once unavailable, and if no failure is present, the DSX-1 port becomes available at the onset of 10 contiguous seconds with no SESs.

Once unavailable, and if a failure is present, the DSX-1 port becomes available at the onset of 10 contiguous seconds with no SESs, if the failure clearing time is less than or equal to 10 seconds. If the failure clearing time is more than 10 seconds, the DSX-1 port becomes available at the onset of 10 contiguous seconds with no SESs, or the period

leading to the successful clearing of the failure, whichever occurs later.

While the port is unavailable, the only performance statistics counter incremented is the count of unavailable seconds.

Line CVs   Number of Line Coding Violations (LCV) for the DSX-1 port. For DSX-1 ports, a line coding violation is synonymous with a bipolar violation. A bipolar violation for an AMI-coded signal is the occurrence of a pulse of the same polarity as the previous pulse. A bipolar violation for a B8ZS-coded signal is the occurrence of a pulse of the same polarity as the previous pulse, when that pulse is not part of the zero substitution code.

Line ESs   Number of Line Errored Seconds (LES) for the DSX-1 port. A line errored second is a second in which one or more line code violation error events occurred.

Path CVs   Number of Path Coding Violations (PCV) for the DSX-1 port. A path coding violation is a frame synchronization bit error in D4 format, or a CRC error in ESF format.

Ctrl Slip Secs   Number of Controlled Slip Seconds (CSS) for the DSX-1 port. A controlled slip second is a one-second interval during which one or more controlled slips occur. A controlled slip is the replication or deletion of a frame. A controlled slip may be performed when there is a difference between the timing of a synchronous receiving terminal and the received signal. A controlled slip does not cause an out of frame defect.

Bursty ESs   Number of Bursty Errored Seconds (BES) for the DSX-1 port. A bursty errored second contains more than 1 and fewer than 320 path coding violation error events, and no severely errored frame or AIS defects. Controlled slips are not included in determining bursty errored seconds.

Degraded Min   Number of Degraded Minutes for the DSX-1 port. A degraded minute is one in which the estimated bit error rate exceeds 1E-6, but does not exceed 1E-3.

Degraded minutes are determined by: collecting all

available seconds, removing any severely errored seconds, grouping the result into 60-second long periods, and counting a 60-second long period (i.e., a minute) as degraded if the error rate for the period exceeds 1E-6.

Available seconds are simply seconds that are not unavailable, according to the definition of unavailable seconds.

5.7 E1 Port Statistics

The E1 Statistics screen reports on the operational status of any E1 port in the *CellPath* 300 system.

5.7.1 Accessing the Screen

To view the E1 Statistics screen, highlight the [E1 Stats...] button for the appropriate port on the Quad E1 Port Selection screen or Tri V.35 & E1 Port Selection screen, then press the <ENTER> key.

```
┌──────────────── E1 Statistics - Port 5:1 ────────────────┐
│                                              [ Events... ] │
│   Port Status: E1 Tx-RAI,LOS                              │
│                                                           │
│                  - Interval  0 of  1 -   ------- Total --------- │
│                      Near End                Near End     │
│   E1 ESs:                 0                        0       │
│   E1 SESs:                0                        0       │
│   E1 SEFSs:               0                        0       │
│   E1 UASs:              194                      880       │
│                                                           │
│   Line CVs:               0                        0       │
│   Line ESs:               0                        0       │
│                                                           │
│   Path CVs:               0                        0       │
│   Ctrl Slip Secs:         0                        0       │
│   Bursty ESs:             0                        0       │
│   Degraded Mins:          0                        0       │
│                                                           │
│                                                           │
│   [ Zero Stats ]                     [ ^Update ]  [ ^OK ] │
│  Update E1 statistics                                     │
└───────────────────────────────────────────────────────────┘
```
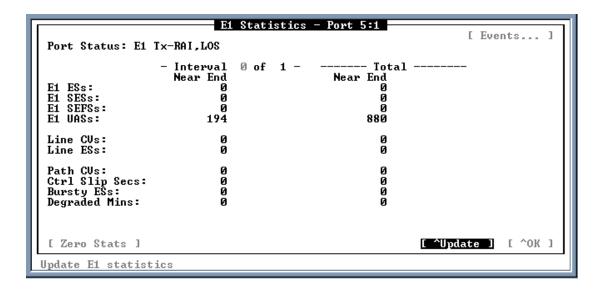
Figure 5.6 - E1 Statistics Screen

5.7.2 Screen Description

The following fields appear on the E1 Statistics screen:

Port Status   Status of the E1 port. This field can contain status messages related to either the physical layer module or the protocol module used by this port. See Section 5.1.5 for more information about the possible contents of this field.

E1 ESs   Number of Errored Seconds (ES) for the E1 port. For E1-CRC links, an ES is a second with one or more path code violations OR one or more out of frame defects OR one or more controlled slip events OR a detected AIS defect. For E1-noCRC links, line code violations also trigger an errored second. The E1 ES count is not incremented during an unavailable second.

E1 SESs   Number of Severely Errored Seconds (SES) for the E1 port. For E1-CRC signals, a severely errored second is a second with 832 or more path code violation events OR one or more out of frame defects. For E1-noCRC signals, a severely errored second is a second with 2048 or more line code violations. Controlled slips are not included in determining the number of E1 severely errored seconds. The E1 SES count is not incremented during an unavailable second.

E1 SEFs   Number of Severely Errored Framing Seconds (SEF) for the E1 port. A severely errored framing second is a second with one or more out of frame or AIS defects.

E1 UASs   Number of Unavailable Seconds (UAS) for the E1 port. A UAS is a second during which the port is unable to transmit or receive traffic. The E1 port is said to be unavailable from the onset of 10 contiguous SESs, or the onset of the condition leading to a failure. If the condition leading to the failure was immediately preceded by one or more contiguous SESs, then the UAS count starts at the beginning of these SESs.

Once unavailable, and if no failure is present, the E1 port becomes available at the onset of 10 contiguous seconds with no SESs.

Once unavailable, and if a failure is present, the E1 port becomes available at the onset of 10 contiguous seconds with no SESs, if the failure clearing time is less than or equal to 10 seconds. If the failure clearing time is more than 10 seconds, the E1 port becomes available at the onset of 10 contiguous seconds with no SESs, or the period leading to the successful clearing of the failure, whichever occurs later.

While the port is unavailable, the only performance statistics counter incremented is the count of unavailable seconds.

Line CVs   Number of Line Coding Violations (LCVs) for the E1 port. For E1 ports, an LCV is synonymous with a bipolar violation. A bipolar violation for an HDB3-coded signal is the occurrence of a pulse of the same polarity as the previous pulse, when that pulse is not part of the zero substitution code.

Line ESs   Number of Line Errored Seconds (LES) for the E1 port. An LES is a second in which one or more line code violation error events occur.

Path CVs   Number of Path Coding Violations (PCV) for the E1 port. A PCV is a frame synchronization bit error in E1-noCRC format, or a CRC error in E1-CRC format.

Ctrl Slip Secs   Number of Controlled Slip Seconds (CSS) for the E1 port. A CSS is a one-second interval during which one or more controlled slips occur.

Bursty ESs   Number of Bursty Errored Seconds (BES) for the E1 port. A BES is a second with more than 1 and fewer than 320 path coding violation error events and no severely errored frame or AIS defects. Controlled slips are not included in determining bursty errored seconds.

Degraded Mins   Number of Degraded Minutes for the E1 port. A degraded minute is one in which the estimated bit error rate exceeds 1E-6, but does not exceed 1E-3. Degraded minutes are determined by collecting all available seconds, removing any severely errored seconds, grouping the result in 60-second-long periods, and counting a 60-second-long period (i.e., a minute) as degraded if the error rate for the period exceeds 1E-6. Available seconds are simply seconds that are not unavailable, according to the definition of unavailable seconds.

5.8   IMA Group Statistics

The IMA Group Statistics screen reports on the operational status of a group of links on an IMA/DS1 or E1 port in the *CellPath* 300 system.

5.8.1   Accessing the Screen

The screen is accessed by pressing the IMA Group [Stats…] button on the IMA Group Configuration screen.
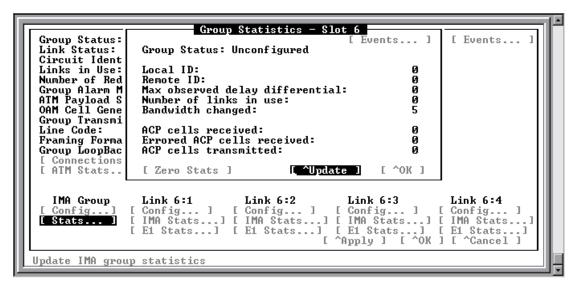
```
┌──────────────────────────────────────────────────────────────────────────┐
│                          Group Statistics - Slot 6                         │▲
│ Group Status:                                    [ Events... ]  [ Events... ]│
│ Link Status:      Group Status: Unconfigured                               │
│ Circuit Ident                                                              │
│ Links in Use:     Local ID:                           0                    │
│ Number of Red     Remote ID:                          0                    │
│ Group Alarm M     Max observed delay differential:    0                    │
│ ATM Payload S     Number of links in use:             0                    │
│ OAM Cell Gene     Bandwidth changed:                  5                    │
│ Group Transmi                                                              │
│ Line Code:        ACP cells received:                 0                    │
│ Framing Forma     Errored ACP cells received:         0                    │
│ Group LoopBac     ACP cells transmitted:              0                    │
│ [ Connections                                                              │
│ [ ATM Stats..    [ Zero Stats ]         [ ^Update ]    [ ^OK ]             │
│                                                                            │
│    IMA Group      Link 6:1       Link 6:2       Link 6:3       Link 6:4    │
│ [ Config...]   [ Config... ]  [ Config... ]  [ Config... ]  [ Config... ]  │
│ [ Stats... ]   [ IMA Stats...][ IMA Stats...][ IMA Stats...][ IMA Stats...]│
│                [ E1 Stats...] [ E1 Stats...] [ E1 Stats...] [ E1 Stats...] │
│                                      [ ^Apply ] [ ^OK ] [ ^Cancel ]        │
│                                                                            │▼
│ Update IMA group statistics                                                │
└──────────────────────────────────────────────────────────────────────────┘
```

Figure 5.7 - IMA Group Statistics Screen

5.8.2   Screen Description

The following fields appear on the IMA Group Statistics screen:

Group Status   The value displayed in the field indicates the current status of the IMA group. A status of Unconfigured indicates that the group has not been configured.

Active indicates that this group has been configured and has no error conditions.

ACP timeout. A timeout occurred due to the non-arrival of an ACP cell. This error will occur when there is only one port in the IMA group.

Bandwidth failure. The bandwidth of the group fell below a certain threshold due to loss of links from the group.

Signal failure indicates a configuration mismatch or non-arrival of LCP cells during the setup of a group.

Differential delay exceeded indicates that the allowable number of milliseconds of delay differential among the component T1/E1 links in the IMA group has been exceeded.

Arbitration failure indicates that the AIMUX-ID could not be resolved between the two ends of the pipe. The IMA group at each end sends out a group ID and tries to establish a connection. If the attempt fails, a new group ID is generated and sent out again. An arbitration failure occurs after this attempt has been made 10 times.

Local ID	This is the group ID used at the local end when sending LCP/ACP cells.
Remote ID	This is the group ID used at the remote end when sending LCP/ACP cells.
Max observed delay differential	The observed number of milliseconds of delay differential between the slowest and the fastest IMA links.
Number of links in use	The number of DS1 or E1 links in use by the IMA function of this group. This does not include links that have delay differentials that exceed the configured limit.
Bandwidth changed	The number of times the bandwidth of an IMA group changed (links went up or down).
ACP cells received	The number of ACP cells received for the group.
Errored ACP cells received	The number of errored ACP cells received for the group.
ACP cells transmitted	The number of ACP cells transmitted for the group.

5.9   IMA Link Statistics

The IMA Link Statistics screen reports on the operational status of each configured link on an IMA port in the *CellPath* 300 system.

5.9.1   Accessing the Screen

The screen is accessed by pressing the [IMA Stats…] button on the IMA Group PLM Configuration screen for a selected link.
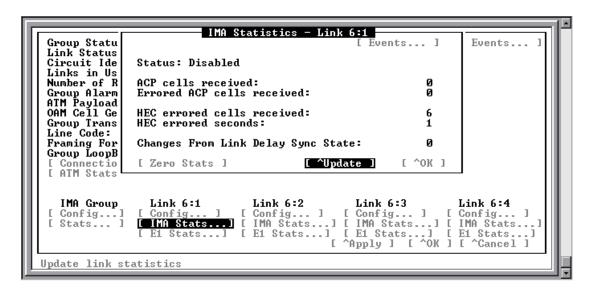
```
                        IMA Statistics - Link 6:1
Group Statu                                     [ Events... ]        Events... ]
Link Status
Circuit Ide   Status: Disabled
Links in Us
Number of R   ACP cells received:                         0
Group Alarm   Errored ACP cells received:                 0
ATM Payload
OAM Cell Ge   HEC errored cells received:                 6
Group Trans   HEC errored seconds:                        1
Line Code:
Framing For   Changes From Link Delay Sync State:         0
Group LoopB
[ Connectio   [ Zero Stats ]        [ ^Update ]      [ ^OK ]
[ ATM Stats


   IMA Group      Link 6:1        Link 6:2        Link 6:3        Link 6:4
[ Config...]   [ Config... ]   [ Config... ]   [ Config... ]   [ Config... ]
[ Stats... ]   [ IMA Stats...] [ IMA Stats...] [ IMA Stats...] [ IMA Stats...]
               [ E1 Stats...]  [ E1 Stats...]  [ E1 Stats...]  [ E1 Stats...]
                                               [ ^Apply ]  [ ^OK ]  [ ^Cancel ]

Update link statistics
```

Figure 5.8 - IMA Link Statistics Screen

5.9.2   Screen Description

The following fields appear on the IMA Link Statistics screen:

Status   The value displayed in the field indicates the current status of the IMA link. A status of Active indicates that this link is currently included in the IMA group. A status of Disabled indicates that this port is currently not included in the IMA group. This line also indicates LCP link failures such as:

<div style="margin-left:auto">Out of LDS indicates that the link is not in Link Delay Sync. This can occur if a bad LCP cell is received (HEC or CRC-10 error) or if a good LCP cell is received but is not in the right position within the frame.</div>

ACP Cells Received   The number of ACP cells received on the link.

Errored ACP Cells Received   The number of ACP cells received on the link that had CRC-10 errors.

HEC errored cells received   The number of HEC errored cells received on all the links currently in the group.

HEC errored seconds   The number of HEC errored seconds for the group. This is the number of seconds in which at least one link in the group experienced a HEC error.

Changes From Link Delay Sync State   The number of times this link went out of Link Delay Sync.

5.10 IMA/DS1 Link Statistics

The `IMA/DS1 Link Statistics` screen reports on the operational status of an IMA/DS1 link in the *CellPath* 300 system.

5.10.1 Accessing the Screen

The screen is accessed by pressing the `[DS1 Stats…]` button on the `IMA Group Configuration` screen for a selected link.
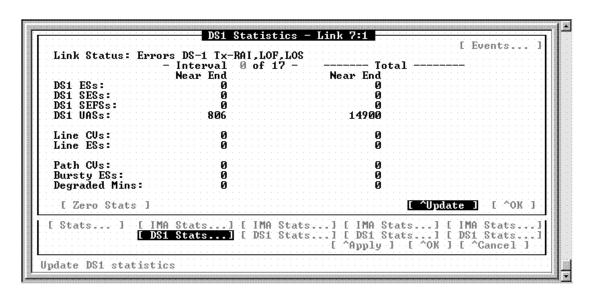
```
┌─────────────────── DS1 Statistics - Link 7:1 ──────────────────┐
│                                                   [ Events... ] │
│ Link Status: Errors DS-1 Tx-RAI,LOF,LOS                        │
│               - Interval  0 of 17 -     ------- Total --------- │
│               Near End                  Near End               │
│ DS1 ESs:          0                         0                  │
│ DS1 SESs:         0                         0                  │
│ DS1 SEFSs:        0                         0                  │
│ DS1 UASs:       806                       14900                │
│                                                                │
│ Line CVs:         0                         0                  │
│ Line ESs:         0                         0                  │
│                                                                │
│ Path CVs:         0                         0                  │
│ Bursty ESs:       0                         0                  │
│ Degraded Mins:    0                         0                  │
│ [ Zero Stats ]                        [ ^Update ]  [ ^OK ]     │
├────────────────────────────────────────────────────────────────┤
│ [ Stats... ]  [ IMA Stats...] [ IMA Stats...] [ IMA Stats...] [ IMA Stats...] │
│               [ DS1 Stats...] [ DS1 Stats...] [ DS1 Stats...] [ DS1 Stats...] │
│                               [ ^Apply ]  [ ^OK ]  [ ^Cancel ] │
├────────────────────────────────────────────────────────────────┤
│ Update DS1 statistics                                          │
└────────────────────────────────────────────────────────────────┘
```

Figure 5.9 - IMA/DS1 Link Statistics Screen

5.10.2 Screen Description

The following fields appear on the `IMA/DS1 Link Statistics` screen:

Link Status	The status of the DS1 link. This field can contain status messages related to either the physical layer module or the protocol module used by this port.

DS1 ESs   The number of Errored Seconds (ES) for the DS1 link.

For ESF links, an errored second contains one or more path code violations OR one or more out of frame defects OR a detected AIS defect. For D4 links, line code violations also trigger an errored second. The DS1 ES count is not incremented during an unavailable second.

DS1 SESs   The number of Severely Errored Seconds (SES) for the DS1 link.

For ESF signals, a severely errored second contains 320 or more path code violations OR one or more out of frame or AIS defects. For D4 signals, a severely errored second contains 1544 or more line code violations, OR one or more framing error events or out of frame defects. DS1 SESs are not incremented during an unavailable second.

DS1 SEFSs   The number of Severely Errored Framing Seconds (SEF) for the DS1 link.

A severely errored framing second is a second with one or more out of frame or AIS defects.

DS1 UASs   The number of Unavailable Seconds (UAS) for the DS1 link.

An unavailable second (UAS) is a second during which the link is unable to transmit or receive traffic. The DS1 link is said to be unavailable from the onset of 10 contiguous SESs, or from the onset of the condition leading to a failure. If the condition leading to the failure was immediately preceded by one or more contiguous SESs, then the UAS count starts at the beginning of these SESs.

Once unavailable, and if no failure is present, the DS1 link becomes available at the onset of 10 contiguous seconds with no SESs.

Once unavailable, and if a failure is present, the DS1 link becomes available at the onset of 10 contiguous seconds with no SESs, if the failure clearing time is less than or equal to 10 seconds. If the failure clearing time is more than 10 seconds, the DS1 link becomes

available at the onset of 10 contiguous seconds with no SESs, or the period leading to the successful clearing of the failure, whichever occurs later.

While the link is unavailable, the only performance statistics counter incremented is the count of unavailable seconds.

Line CVs   The number of Line Coding Violations (LCV) for the DS1 link.

For DS1 links, a line coding violation is synonymous with a bipolar violation. A bipolar violation for a B8ZS-coded signal is the occurrence of a pulse of the same polarity as the previous pulse, when that pulse is not part of the zero substitution code.

Line ESs   The number of Line Errored Seconds (LES) for the DS1 link.

A line errored second is a second in which one or more line code violation error events occurred.

Path CVs   The number of Path Coding Violations (PCV) for the DS1 link.

A path coding violation is a frame synchronization bit error in D4 format, or a CRC error in ESF format.

Bursty ESs   The number of Bursty Errored Seconds (BES) for the DS1 link.

A bursty errored second contains more than 1 and fewer than 320 path coding violation error events, and no severely errored frame or AIS defects.

Degraded Mins   The number of Degraded Minutes for the DS1 link.

A degraded minute is one in which the estimated bit error rate exceeds 1^{-6} but does not exceed 1^{-3}.

Degraded minutes are determined by: collecting all available seconds, removing any severely errored seconds, grouping the result into 60-second-long periods, and counting a 60-second-long period (i.e., a minute) as degraded if the error rate for the period exceeds 1^{-6}.

Available seconds are simply seconds that are not unavailable, according to the definition of unavailable seconds.

5.11 IMA/E1 Link Statistics

The IMA/E1 Link Statistics screen reports on the operational status of an IMA/E1 link in the *CellPath* 300 system.

5.11.1 Accessing the Screen

The screen is accessed by pressing the [E1 Stats…] button on the IMA Group Configuration screen for a selected link.

```
┌─────────────────────── E1 Statistics ─ Link 6:1 ───────────────────────┐ ▲
│                                                              [ Events... ] │
│   Link Status: Errors E1 Tx-RAI,LOF,LOS                                   │
│                     ─ Interval  0 of   4 ─      ─────── Total ─────────    │
│                     Near End                    Near End                  │
│   E1 ESs:                   0                       0                      │
│   E1 SESs:                  0                       0                      │
│   E1 SEFSs:                 0                       0                      │
│   E1 UASs:                598                    3337                      │
│                                                                           │
│   Line CUs:                 0                       0                      │
│   Line ESs:                 0                       0                      │
│                                                                           │
│   Path CUs:                 0                       0                      │
│   Bursty ESs:               0                       0                      │
│   Degraded Mins:            0                       0                      │
│    [ Zero Stats ]                                 [ ^Update ]  [ ^OK ]     │
│ ────────────────────────────────────────────────────────────────────────│
│ [ Stats... ]  [ IMA Stats...] [ IMA Stats...] [ IMA Stats...] [ IMA Stats...]│
│               [ E1 Stats...]  [ E1 Stats...]  [ E1 Stats...]  [ E1 Stats...]│
│                                      [ ^Apply ]  [ ^OK ] [ ^Cancel ]      │
│ Update E1 statistics                                                      │ ▼
└───────────────────────────────────────────────────────────────────────────┘
```
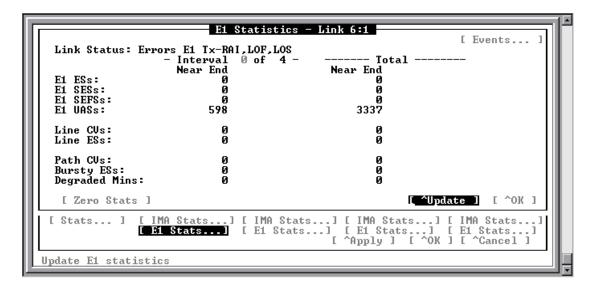
Figure 5.10 - IMA/E1 Statistics Screen

5.11.2 Screen Description

The following fields appear on the IMA/E1 Statistics screen:

Link Status	The status of the E1 link. This field can contain status messages related to either the physical layer module or the protocol module used by this port.
E1 ESs	The number of Errored Seconds (ES) for the E1 link.
	For E1-CRC links, an errored second is a second with one or more path code violations OR one or more out of frame defects OR a detected AIS defect.

For E1-noCRC links, line code violations also trigger an errored second.

The E1 ES count is not incremented during an unavailable second.

E1 SESs The number of Severely Errored Seconds (SES) for the E1 link.

For E1-CRC signals, a severely errored second is a second with 832 or more path code violation events OR one or more out of frame defects. For E1-noCRC signals, a severely errored second is a second with 2048 or more line code violations. The E1 SES count is not incremented during an unavailable second.

E1 SEFSs The number of Severely Errored Framing Seconds (SEF) for the E1 link.

A severely errored framing second is a second with one or more out of frame or AIS defects.

E1 UASs The number of Unavailable Seconds (UAS) for the E1 link.

An unavailable second (UAS) is a second during which the link is unable to transmit or receive traffic. The E1 link is said to be unavailable from the onset of 10 contiguous SESs, or the onset of the condition leading to a failure. If the condition leading to the failure was immediately preceded by one or more contiguous SESs, then the UAS count starts at the beginning of these SESs.

Once unavailable, and if no failure is present, the E1 link becomes available at the onset of 10 contiguous seconds with no SESs.

Once unavailable, and if a failure is present, the E1 link becomes available at the onset of 10 contiguous seconds with no SESs, if the failure clearing time is less than or equal to 10 seconds. If the failure clearing time is more than 10 seconds, the E1 link becomes available at the onset of 10 contiguous seconds with no SESs, or the period leading to the successful clearing of the failure, whichever occurs later.

While the link is unavailable, the only performance statistics counter incremented is the count of unavailable seconds.

Line CVs The number of Line Coding Violations (LCV) for the E1 link.

For E1 links, a line coding violation is synonymous with a bipolar violation. A bipolar violation for an HDB3-coded signal is the occurrence of a pulse of the same polarity as the previous pulse, when that pulse is not part of the zero substitution code.

Line ESs The number of Line Errored Seconds (LES) for the E1 link.

A line errored second is a second in which one or more line code violation error events occur.

Path CVs The number of Path Coding Violations (PCV) for the E1 link.

A path coding violation is a frame synchronization bit error in E1-noCRC format, or a CRC error in E1-CRC format.

Bursty ESs The number of Bursty Errored Seconds (BES) for the E1 link.

A bursty errored second is a second with more than 1 and fewer than 320 path coding violation error events and no severely errored frame or AIS defects.

Degraded Mins The number of Degraded Minutes for the E1 link.

A degraded minute is one in which the estimated bit error rate exceeds 1^{-6} but does not exceed 1^{-3}. Degraded minutes are determined by collecting all available seconds, removing any severely errored seconds, grouping the result in 60-second-long periods, and counting a 60-second-long period (i.e., a minute) as degraded if the error rate for the period exceeds 1^{-6}. Available seconds are simply seconds that are not unavailable, according to the definition of unavailable seconds.

5.12 CBR Port Statistics

The CBR Statistics screen reports on the operational status of any CBR port in the *CellPath* 300 system at the cell level.

5.12.1 Accessing the Screen

To view the CBR Statistics screen, highlight the [CBR Stats...] button on a port con-figuration screen for a CBR port (or for a selected CBR port on a port selection screen for a multi-port module), then press the <ENTER> key.

```
                        ATM CBR Statistics - Port 4:2
                                          NEW [ Events... ]  s... ]
            Port Status: V.35/EIA-530 LOC
                                                            ... ]
    Port                - Interval  0 of  3 -    - Total -
    Port    Out Good Cells:         0                      0
            Out SNP Errs:           0                      0
    4:1     Out Seq Errs:           0                      0

      U    [ Zero Stats ]                  [ ^Update ]  [ ^OK ]
      U

    [ Config...      ] [ Config...      ] [ Config...    ] [ Config...      ]
    [ Pkt Stats...  ] [ CBR Stats...  ] [ Pkt Stats...  ] [ CBR Stats...  ]
                                                          [ DSX-1 Stats...]
    [ Link Mgmt...  ]                    [ Link Mgmt...  ]

    [ Connections...] [ Connections...] [ Connections...] [ Connections...]

                                                         [ ^Cancel ]


  Update CBR statistics
```
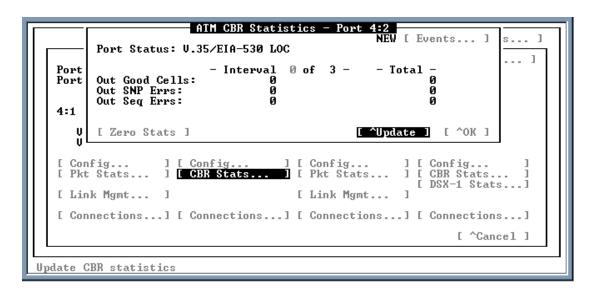
Figure 5.11 - ATM CBR Statistics Screen

5.12.2 Screen Description

The following fields appear on the CBR Statistics screen:

Port Status	Status of this CBR port. This field can contain status messages related to either the physical layer module or the protocol module used by this port. See Section 5.1.5 for more information about the possible contents of this field.

Out Good Cells   Number of valid CBR cells (i.e., cells with valid data, as opposed to all ones) transmitted out the port.

Out SNP Errs   Number of cells presented for transmission that arrive with SNP CRC errors. These cells are discarded.

Out Seq Errs   Number of cells presented for transmission that arrive with sequence number errors. If a cell contains a sequence number error (i.e., is out-of-sequence), the *CellPath* 300 updates this parameter, sends a cell with a payload of all ones, then restarts the sequence with the next cell.

5.13 Packet Statistics

The Packet Statistics screen reports on the operational status of any packet port in the *CellPath* 300 system.

5.13.1 Accessing the Screen

To view the Packet Statistics screen, highlight the [Packet Stats...] button on a port configuration screen for a packet port (or for a selected packet port on a port selection screen for a multiport module), then press the <ENTER> key.

```
┌─────────────────────Packet Statistics - Port 4:1──────────────────┐
│                                                  NEW [ Events... ] │
│  Port Status: V.35/EIA-530 LOC                                     │
│                                                                    │
│                            - Interval  0 of  3 -  ------- Total -------- │
│                              Receive  Transmit     Receive    Transmit   │
│  Valid HDLC Packets:            0                     0                │
│  Errored HDLC Packets:          0                     0                │
│  Invalid Header HDLC Packets:   0                     0                │
│  Segmented Cells:               0                     0                │
│                                                                    │
│  Valid Reassembly Cells:                  0                      0 │
│  Errored Reassembly Cells:                0                      0 │
│  Tossed Cells <Congestion>:               0                      0 │
│  Tossed Cells <>PCR>:                     0                      0 │
│  Tossed Cells <No Buffer>:                0                      0 │
│  Completed Reassembly Packets:            0                      0 │
│  Errored Reassembly Packets:              0                      0 │
│  Timed-out Reassembly Packets:            0                      0 │
│                                                                    │
│  [ Zero Stats ]                          [ ^Update ]   [ ^OK ]     │
├────────────────────────────────────────────────────────────────────┤
│  Update packet statistics                                          │
└────────────────────────────────────────────────────────────────────┘
```

Figure 5.12 - Packet Statistics Screen

5.13.2 Screen Description

The following fields appear on the Packet Statistics screen:

Port Status Status of this packet port. This field can contain status messages related to either the physical layer module or the protocol module used by this port. See Section 5.1.5 for more information about the possible contents of this field.

Valid HDLC Packets	Number of valid packets (i.e., packets with no errors) received by the port.
Errored HDLC Packets	Total of packets with CRC errors, packets that are too long, and packets that are too short (i.e., not long enough to contain valid header/trailers) received by the port.
Invalid Header HDLC Packets	Number of packets with a DFA/DLCI that does not match any valid connection provisioned at the receive port (ATM DXI Mode 1B and Frame Relay UNI only).
Segmented Cells	Number of ATM cells generated by the segmentation process and sent to the *CellPath* 300 cell bus.
Valid Reassembly Cells	Number of non-errored SAR_PDUs (cells) received from the *CellPath* 300 cell bus for reassembly and transmission.
Errored Reassembly Cells	Number of SAR_PDUs (cells) with detected error conditions (AAL3/4 only) received from the *CellPath* 300 cell bus.
Tossed Cells (Congestion)	Number of cells discarded by the rate controller due to congestion. This condition occurs when several network users, each transmitting within their contracted bandwidth, attempt to send cells at the same time.
Tossed Cells (>PCR)	Number of cells discarded for violating the provisioned Peak Cell Rate (PCR) for the connection. This condition occurs when one or more network users attempt to send cells at greater than their contracted bandwidth.
Tossed Cells (No buffer)	Number of cells discarded due to a lack of available memory or other internal error conditions within the *CellPath* 300. This statistic is included to account for all generated cells, according to the following formula:
	Generated Cells = Xmt. Valid Cells + Tossed (Congest) + Tossed (>PCR) + Tossed (Memory).
Completed Reassembly Packets	Number of packets reassembled from cells and transmitted out the packet port.

Performance Monitoring

Errored Reassembly Packets   Number of packets lost to errors detected during reassembly, except timed-out packets.

Timed Out Reassembly Packets   Number of packets that timed out and were discarded during reassembly.

Xmt. Err. Cells   Number of SAR_PDUs (cells) with detected error conditions (AAL3/4 only) received from the *CellPath* 300 cell bus.

Xmt. Valid Pkts   Number of packets reassembled from cells and transmitted out the packet port.

5.14 ATM Cell Statistics

The `ATM Cell Statistics` screen reports on the operational status of any port in the *Cell-Path* 300 system at the cell level.

5.14.1 Accessing the Screen

To view the `ATM Cell Statistics` screen, highlight the `[ATM  Stats...]` button on a `Cell Port Configuration` screen (or on the `Port Selection` screen for a multiport module), then press the `<ENTER>` key.

```
┌──────────────────ATM Cell Statistics - Port 3:1─────────────────┐
│                                                    NEW [ Events... ] │
│  Port Status:                                                        │
│                      - Interval  0 of  3 -    ------- Total -------- │
│                        Receive    Transmit      Receive    Transmit  │
│  Valid UBR Cells:         0           0            0           0      │
│  Valid CBR Cells:         0           0            0           0      │
│  Empty Cells:             0                        0                  │
│  Invalid Cells:           0                        0                  │
│  HEC Errors:              0                        0                  │
│  Tossed (Congest):                    0                       0      │
│  Tossed (> PCR):                      0                       0      │
│  Attempted Utilization: 0.0%        0.0%         0.0%        0.0%     │
│  Receive Errors:        0.0%                     0.0%                 │
│                                                                      │
│                                                                      │
│                                                                      │
│  [ Zero Stats ]                             [ ^Update ]   [ ^OK ]    │
│  Update cell statistics                                              │
└──────────────────────────────────────────────────────────────────┘
```
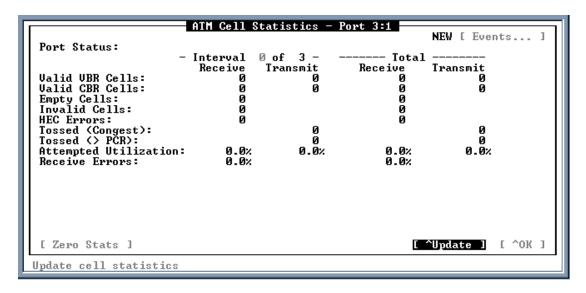
Figure 5.13 - ATM Cell Statistics Screen

5.14.2 Screen Description

The following fields appear on the `ATM Cell Statistics` screen:

Port Status   Status of this cell port. This field can contain status messages related to either the physical layer module or the protocol module used by this port. See Section 5.1.5 for more information about the possible contents of this field.

Valid VBR Cells	Number of valid VBR cells transmitted or received at the port.
Valid CBR Cells	Number of valid CBR cells transmitted or received at the port.
Empty Cells	Number of empty cells received at the port (current interval only).
Invalid Cells	Number of invalid cells received at the port.
HEC Errors	Number of cells with HEC errors received at the port.
Rcv. Utilization	Number of valid cells (Valid VBR Cells + Valid CBR Cells) received at the port, divided by the theoretical maximum number of cells for the port, and expressed as a percentage.
Rcv. Error	Number of errored cells (Invalid Cells + HEC Errors) received at the port, divided by the theoretical maximum number of cells for the port, and expressed as a percentage.
Tossed (Congest)	Number of cells discarded (not transmitted) due to congestion at the port.
Tossed (>PCR)	Number of cells discarded (not transmitted) due to VBR connections that exceeded their provisioned PCR rate.
Attempted Xmt. Utilization	Number of cells presented at the port for transmission (Valid VBR Cells + Valid CBR Cells + Tossed (Congest)), divided by the theoretical maximum number of cells for this port, and expressed as a percentage.

5.15 Frame Relay Link Management Statistics

> **NOTE**
>
> The Frame Relay Link Management Statistics screen reports on the status of the monitored link.

5.15.1 Accessing the Screen

To access this screen, select the [Statistics...] button on the Frame Relay Link Management Configuration screen. Figure 5.14 is displayed.

```
┌──────── Frame Relay Link Management Statistics - Port 4:3 ───────┐
│                                                      [ Events... ]  │
│ Link Management Status: Disabled                                   │
│ Auto-Detection State:   None                                       │
│                                              Network          User │
│ Link Integrity Verification Requests:           0             0    │
│ Link Integrity Verification Responses:          0             0    │
│ Full Status Requests:                           0             0    │
│ Full Status Responses:                          0             0    │
│ Single PVC Asynchronous Status Messages:        0             0    │
│ Invalid Messages:                               0             0    │
│ Invalid Receive Sequence Numbers:               0             0    │
│ Timeouts (T392/T391 Expirations):               0             0    │
│ Service-Affecting Conditions:                   0             0    │
│                                                                    │
│ AIS F5 OAM Cells (From/Towards ATM VCCs):       0             0    │
│ RDI F5 OAM Cells (From/Towards ATM VCCs):       0             0    │
│                                                                    │
│ Active PVCs (Reported/Learned):                 0             0    │
│ Inactive PVCs (Reported/Learned):               0             0    │
│                                                                    │
│ [ Zero Stats ]                              [ ^Update ]  [ ^OK ]   │
├────────────────────────────────────────────────────────────────────┤
│ Update FRLM Statistics                                             │
└────────────────────────────────────────────────────────────────────┘
```

Figure 5.14 - Frame Relay Link Management Statistics Screen

5.15.2 Screen Description

The following fields appear on the Frame Relay Link Management Statistics screen:

Link Management Status	Displays the current status of the link. The indicators are:
	Disabled Operational mode fields are both set to Disabled.

	Network-SACFRLM link is down due to a network device service-affecting condition.
	User-SACFRLM link is down due to a user device service-affecting condition.
	Link UpFRLM link is active.
Auto-Detection State	Displays the type of STATUS ENQUIRY message that was last received by the network device. The indicators are None (no STATUS ENQUIRY messages have been received), **ITU-T Q.933 Annex A, or ANSI T1. 617a-1994 Annex D.**
Link Integrity Verification Requests	NetworkDisplays the number of Link Integrity Verification (LIV) requests received.
	UserDisplays the number of Link Integrity Verification (LIV) requests transmitted.
Link Integrity Verification Responses	NetworkDisplays the number of Link Integrity Verification (LIV) responses transmitted.
	UserDisplays the number of Link Integrity Verification (LIV) responses received.
Full Status Requests	NetworkDisplays the number of Full Status requests received.
	UserDisplays the number of Full Status requests transmitted.
Full Status Responses	NetworkDisplays the number of Full Status responses transmitted.
	UserDisplays the number of Full Status responses received.
Single PVC Asynchronous Status Messages	NetworkDisplays 0 since the *CellPath 300* does not generate these optional messages.
	UserDisplays the number Single PVC Asynchronous Status messages received.
Invalid Messages	This field displays the number of messages received with invalid field values or invalid length. Values that are considered invalid include:
	Network
	unnumbered information frame protocol discriminator

call reference
unsupported message types

Network or User

information element identifier
information element length
report type

These invalid messages are not considered errors but may lead to a timeout which is consequently counted as an error.

Invalid Receive Sequence Numbers   NetworkDisplays the number of valid received messages containing a receive sequence number that does not match the send sequence number of the last transmitted message when the port is configured as a network device.

UserDisplays the number of valid received messages containing a receive sequence number that does not match the send sequence number of the last transmitted message when the port is configured as a user device.

Timeouts (T392/T391 Expirations)   NetworkNumber of times the port did not receive a Link Integrity Verification or Full Status request within the Polling Timeout (T392) when the port is configured as a network device.

UserNumber of times the port did not receive a Link Integrity Verification or Full Status request within the Polling Interval (T391) when the port is configured as a user device.

Service-Affecting Conditions   NetworkDisplays the number of service-affecting conditions that have occurred on this port (when configured as network device) based upon the Error Threshold.

UserDisplays the number of service-affecting conditions that have occurred on this port (when configured as user device) based upon the Error Threshold.

AIS F5 OAM Cells (From/Towards ATM VCCs)   FromDisplays the number of AIS F5 OAM cells received *from* the ATM VCCs that terminate on this port. Note that these cells enter the *CellPath 300*

through some other port, on ATM VCCs whose ultimate endpoint is this port.

TowardsDisplays the number of AIS F5 OAM cells transmitted *towards* the ATM VCCs that emanate from this port. Note that these cells are generated by this port, and are then passed out onto ATM VCCs through some other port.

RDI F5 OAM Cells (From/Towards ATM VCCs)

FromDisplays the number of RDI F5 OAM cells received *from* the ATM VCCs that terminate on this port. Note that these cells enter the *CellPath 300* through some other port, on ATM VCCs whose ultimate endpoint is this port.

TowardsDisplays the number of RDI F5 OAM cells transmitted *towards* the ATM VCCs that emanate from this port. Note that these cells are generated by this port, and are then passed out onto ATM VCCs through some other port.

Active PVCs (Reported/Learned)

ReportedDisplays the number of active PVCs on the link, as *reported* to the other device, when link management on this port is enabled to operate in network device mode.

LearnedDisplays the number of active PVCs on the link, as *learned* from the other device, when link management on this port is enabled to operate in user device mode.

Inactive PVCs (Reported/ Learned)

ReportedDisplays the number of inactive PVCs on the link, as *reported* to the other device, when link management on this port is enabled to operate in network device mode.

LearnedDisplays the number of inactive PVCs on the link, as *learned* from the other device, when link management on this port is enabled to operate in user device mode.

CHAPTER 6   **Troubleshooting**

6.1   Overview

Troubleshooting generally follows the following sequence of events:

1. A trap reports a problem, a new event in the `Event History Report`, or an LED.
2. If necessary, the *CellPath* 300 user interface can be accessed via a serial port or Telnet connection and the `Event History Report` can be examined.
3. Look up the alarm condition in the *CellPath* 300 Troubleshooting Tree (Section 6.5) and follow the advice given there.
4. If more information is needed, the loopback and test functions provided by the *CellPath* 300 can be used to further isolate the problem. Loopbacks are discussed in detail in Chapter 7.

This chapter provides information about these topics to help troubleshoot *CellPath* 300 system problems:

- Alarm indicators and the various ways they inform of an alarm condition
- The `Event History Report` and its contents
- Alarm priorities and the order in which alarms should be resolved
- Alarm conditions and possible solutions for them

Troubleshooting

6.2   Alarm Indicators

An alarm condition may be indicated in several ways: an SNMP trap sent to an SNMP manager, the user interface reporting a new event, or the *CellPath* 300 LEDs indicating an alarm.

6.2.1   SNMP Traps

The *CellPath* 300 enterprise-specific MIB defines several new traps. When an alarm condition occurs, a trap is sent (if the *CellPath* 300 is so configured) to the SNMP manager, such as FORE Systems *ForeView.* The SNMP manager needs to have the *CellPath* 300 enterprise MIB installed for the traps to display properly. To install the *CellPath* 300 enterprise-specific MIB with an SNMP manager, consult the SNMP manager's user manual.

6.2.2   "NEW" Event Indicator

When a new event is logged in the Event History Report, the word NEW appears in front of the [Events...] button in the user interface as shown in Figure 6.1. NEW disappears when the [Events...] button is selected, opening the Event History Report.

Figure 6.1 - *CellPath* 300 System Screen

6.2.3   LEDs

The front panel LEDs, system controller LEDs, and protocol module LEDs on the *CellPath* 300 can sometimes indicate the source of a problem. Table 6.1 provides a description of the LED colors and their meanings.

Table 6.1 - Front Panel LED States

LED	State	Description
System status	Red	An alarm is present in the system
	Green	There are no alarms in the system
	Off	The system is not powered
Upper power supply (Power A)	Red	One or more of the power supply outputs has failed
	Green	The power supply outputs are all operational
	Off	No power supply is installed
Lower power supply (Power B)	Red	One or more of the power supply outputs has failed
	Green	The power supply outputs are all operational
	Off	No power supply is installed

6.3 Event History Report

The `Event History Report` provides information about the nature of an alarm. With this information the entry in the troubleshooting tree can be found that provides possible solutions to the problem.

The `Event History Report` shows a listing of the most recent one hundred events detected by the *CellPath* 300. The events may be alarms requiring attention, or they may be more informative in nature, such as a message that indicates successful insertion of a protocol module.

6.3.1 Accessing the Event History Report

The word `NEW` appears in front of the `[Events...]` button on the *CellPath* 300 `System Configuration` screen when a new event is entered in the report. Move the cursor to the `[Events...]` button and press `<ENTER>` to open the report. `NEW` disappears when the `[Events...]` button is selected. Figure 6.2 shows a typical `Event History Report`. Table 6.2 describes the various columns in the `Event History Report`. Table 6.3 describes the `Event Message Types` displayed in the `Event Description` field.

```
┌──────────────────────── Event History Report ────────────────────────┐
│                                                                        │
│     TimeStamp                 Event Description                        │
│  ┌──────────────────────────────────────────────────────────────────┐ │
│  │14-Feb-94 05:33:09  Slot 3: PM/PLM = 4/11: configuration match     │ │
│  │14-Feb-94 05:32:57  Slot 3: PM/PLM = 4/8: PLM removed              │ │
│  │14-Feb-94 05:16:29  Slot 2: PM/PLM = 6/4: configuration match      │ │
│  │14-Feb-94 05:16:25  Slot 2: PM = 6: inserted                       │ │
│  │14-Feb-94 05:13:39  Slot 2: PM/PLM = 6/4: config mismatch vs 6/5   │ │
│  │14-Feb-94 05:10:36  Port 42: V.35/EIA: Loss of Clock               │ │
│  │14-Feb-94 05:10:35  Slot 5: PM/PLM = 5/5: configuration match      │ │
│  │14-Feb-94 05:10:35  Slot 4: PM/PLM = 5/6: configuration match      │ │
│  │14-Feb-94 05:10:34  Slot 3: PM/PLM = 4/8: configuration match      │ │
│  │14-Feb-94 05:10:32  System cold-start                              │ │
│  │14-Feb-94 05:10:31  Link up: 'ether1'                              │ │
│  │14-Feb-94 05:10:31  System: PCMCIA card inserted                   │ │
│  │14-Feb-94 05:10:31  Link up: 'lp0'                                 │ │
│  │                                                                    │ │
│  └──────────────────────────────────────────────────────────────────┘ │
│                                                                        │
│   [ Clear All Events ]                              [ ^Cancel ]        │
│                                                                        │
│ Exits this form                                                        │
└────────────────────────────────────────────────────────────────────────┘
```

Figure 6.2 - Event History Report

Table 6.2 - Event History Report Screen Description

Field	Description
Time Stamp	The date and time the event was recorded. The time is taken from the *CellPath* 300 system clock, which is set in the System Administration screen.
Event Description	The description of the event.
Clear All Events	Pressing <ENTER> while the cursor is on this selection clears the Event History Report.
[^Cancel]	Pressing <ENTER> while the cursor is on this selection closes the Event History Report and does not clear the current history.

Table 6.3 - Event Message Types

Event type	Description
System	These are events that have happened to the *CellPath* 300 system. The possible events are: • cold start • link up • link down • PCMCIA events • power supply events • chassis fan events
PM / PLM	These events take the form: 'Slot *n*: *message*' and deal with protocol module and physical layer module insertions, removals, compatibility, and failures.
Ports	These events take the form: 'Port: *n*: *message*' and deal with port status events. This includes FIFO overflows, loss of signal, out of frame, etc.

6.3.1.1 Module ID Numbers in the Event History Report

For many *CellPath* 300 module-related events, event messages are put in the Event History Report. These messages call out module types using only their module ID numbers rather than the full module name. For example:

```
10-Oct-95 14:19:27 Slot 3: PM/PLM = 4/9: configuration match
```

In this example, PM/PLM = 4/9 means that the PM ID is 4 and the PLM ID is 9. By referring to the table below it can be seen that the 4/9 pairing is a 10200 Cell Protocol Module and a 10300 DS3 Physical Layer Module.

These ID codes also appear in the values reported in SNMP traps sent corresponding to *CellPath* 300 module-related events.

Table 6.4 - System Controller and Protocol Module IDs

Module ID	Module Type
3	10010 System Controller Module
4	10200 Cell Protocol Module
5	10203 Quad Packet/CBR Protocol Module
6	10202 Quad Cell Protocol Module
8	10201 Packet Protocol Module
Other	The true module ID from the Protocol Module when the ID is reported as 2 (unsupported).

Troubleshooting

Table 6.5 - Physical Layer Module IDs

Module ID	Physical Layer Module Type
0	PLM ID empty or undefined
3	10020 Extension Module
4	10302 Quad DSX-1
5	10307 Quad E1
6	10303 Tri V.35 ∕ EIA-530 & DSX-1
7	10308 Tri V.35 ∕ EIA-530 & E1
8	10306 E3
9	10300 DS3
10	10304 OC-3c ∕ STM1 Multimode
11	10305 OC-3c ∕ STM1 Single Mode
12	10310 J2
13	10309 Quad V.35 ∕ EIA-530
13	10301 HSSI PLM
15	10312 IAM DS1 PLM
16	10313 IMA E1 PLM
Other	The true module ID from the PLM when the ID is reported as 2 (unsupported).

6.4   Recommended Alarm Resolution Order

Alarms are monitored per module (and per port, if a module has more than one port). While there are no fixed rules about the order in which to handle alarms, there are some general guidelines.

Alarm conditions are monitored on a per-module-basis. If a protocol module has an alarm and its paired physical layer module has an alarm, both alarms are reported. Just because the modules are paired does not mean that protocol module alarms eclipse physical layer module alarms or vice versa. If the physical layer module in question has multiple ports, alarms are monitored per port.

There are no hard and fast rules specifying what alarm conditions to address first. Some general rules do apply, however. For instance, it is possible that an alarm on a PLM can cause an alarm on a PM. If the alarm on the PLM is fixed, the PM's alarm goes away. Therefore, alarms dealing with hardware or physical layer modules should be addressed before alarms dealing with protocol modules.

An approximate priority of alarms is shown below. The highest priority is listed at the top.

Highest Priority		Hardware Failure
		Loss of Signal
		Out of Frame
		Yellow Alarm
		Alarm Indication Signal
Lowest Priority		Buffer Overflow
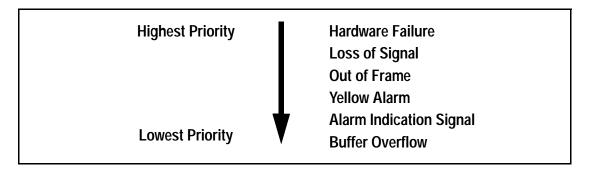
Figure 6.3 - Recommended Alarm Resolution Order

6.5 Troubleshooting Tree

This section lists the various errors that can occur on the *CellPath* 300, along with possible causes of those errors.

6.5.1 AIMUX: ACP Timeout

A timeout occurred because an ACP cell did not arrive as expected. An ACP timeout may occur because: 1) the group at the remote end has been disabled, 2) the remote end lost power, 3) ACP cells are not being forwarded through the network, or 4) a loopback has been set on this group.

Check the status on the `Physical Layer Statistics` screen (`E1` or `DS1`), then check the `IMA Statistics` screen to determine where the error is occurring. To troubleshoot this condition:

- If the group at the remote end has been brought down, remotely access the `IMA Configuration` screen. If the `Group Status` displays `Unconfigured`, re-enable the group (make sure all links included in the group are enabled first).

- If the timeout is caused by a loss of power, ask the operator to check the remote end to identify and correct the problem.

- If the network is not forwarding the ACP cells, check with the service provider to trace the source of the problem.

6.5.2 AIMUX: Arbitration Failure

The IMA group failed to establish a group ID and connection in ten attempts. To troubleshoot this condition:

- Disable the group on both ends, and then re-enable both ends.

- If this message is received again, call FORE Systems' Technical Support.

6.5.3 AIMUX: Bandwidth Failure

The bandwidth of the group fell below a certain threshold, as established by the number of redundant links, due to loss of links from the group. A link may be bad because a physical line failed or because an Out of LDS error occurred. Check the `Physical Layer Statistics` screen (`E1` or `DS1`), then check the `IMA Statistics` screen to determine where the error is occurring. To troubleshoot this condition:

- Correct any physical line problems (see the list of `DS1` or `E1` error messages later in this chapter for more information on the physical interfaces).

- See Section 6.5.6 if an Out of LDS error occurs.

6.5.4   AIMUX: Differential Delay Exceeded

The differential delay exceeded the allowable number of milliseconds of delay between the T1 or E1 links that are currently in use by the IMA group. The routes used by these links are too disparate, causing cells on some links to arrive much later than those on other links. To troubleshoot this condition:

- Ask the service provider to reroute the links so that the delay between the links is less than 50 ms.

6.5.5   AIMUX: Major Group Alarm

This message is displayed if the number of redundant links is reduced such that the number of redundant links exceeds the number of links in alarm. To troubleshoot this problem:

- Increase the number of redundant links.

6.5.6   AIMUX: Out of LDS

A link is not in Link Delay Sync or a good LCP cell is received but is not in the right position within the frame. This error occurs at the link level only (does not appear in the `Group Status` field). Check the physical layer (`E1` or `DS1`) `statistics` screen, then check the `IMA Statistics` screen to determine where the error is occurring. To troubleshoot this problem:

- Make sure that both ends of the connection are `Enabled`.
- If the connection is okay, check with the service provider to trace the source of the problem and ensure LCP cells are being forwarded.

6.5.7   AIMUX: Signal Failure

A signal failure may occur due to a configuration mismatch or the nonarrival of LCP cells during the setup of a group occurred. This message only occurs when first bringing up a group.

A configuration mismatch may occur if the selected links on one end of the connection do not match the other end, for example, if four links are included in the group at one end and only three on the other end.

The nonarrival of LCP cells may occur if the remote end is not yet enabled or if a loopback has been set on the group. To troubleshoot this condition:

- Verify the configuration on both ends of the connection. Make sure the parameters match, take both ends down, and then try bringing them back up again.
- Set the `Loopback` field to `None`.

6.5.8   CBR: Input FIFO Overflow

The sending device has overflowed the input buffer at the CBR port and cells have been lost. This happens when the sending device is generating traffic at a rate that exceeds the bandwidth of the CBR connection that configured on the *CellPath* 300. To troubleshoot this condition:

- Reconfigure the CBR connection so that it has adequate bandwidth (see the *CellPath 300 ATM WAN Multiplexer Configuration Manual* for a formula for determining the correct bandwidth to use).

6.5.9   CBR: Output FIFO Overflow

The traffic at the output side of the CBR port is being transmitted slower than it is being received from the *CellPath* 300 cell bus and so the output buffer is overflowing.

In general, the problem is that the CBR connection is not synchronized end-to-end. The faster device is transmitting traffic through the network and to the *CellPath* 300. The *CellPath* 300 is receiving the traffic and putting it onto the cell bus without error. The traffic is passed through to the CBR port to be output. But the clock rate of the output port does not match the clock rate of the device from which the traffic originated and so it is not emitted from the output buffer fast enough and overflow occurs. To troubleshoot this condition:

- The entire CBR connection must be synchronous end-to-end. Make sure the clock rates of the devices at either end of the connection match each other and match the transmit clock rate of the CBR ports on the *CellPath* 300.

6.5.10   CBR: Output FIFO Underflow

There is not enough traffic in the output buffer, so there is no traffic to transmit to the CBR link. There are two possible causes of this problem.

One possible cause is an overflow condition at a cell port CBR buffer. All CBR connections on a cell port pass through the same input buffer. If for some reason the cell port's CBR input buffer overflows, the *CellPath* 300 discards any CBR cells that arrive. This means that, for instance, one CBR connection could cause the CBR input buffer on the cell port to overflow, resulting in traffic loss on other CBR connections attempting entry into the buffer. If these connections then exit at a CBR port, the traffic loss could result in underflow in the CBR output buffer.

The other cause is that the CBR connection is not synchronized end-to-end, causing the network to discard cells somewhere. The slower device is transmitting traffic through the network and to the *CellPath* 300. The *CellPath* 300 receives the traffic and puts it onto the cell bus without error. The traffic is passed through to the CBR port to be output. But the clock rate of the output port is faster than the clock rate of the device from which the traffic originated and so the output buffer empties and underflow occurs. To troubleshoot this condition:

- Check for cell port CBR input FIFO overflows and resolve as described in Section 6.5.11.

- Make sure the *CellPath* 300 CBR port and the remote device are in agreement on the data rate and bandwidth of the connection. Also make sure that the network is synchronous end-to-end.

- Make sure the network is not losing cells.

6.5.11 CELL: CBR Input FIFO Overflow

This cell port is receiving CBR traffic at a rate that exceeds the aggregate bandwidth of the CBR connections. The traffic arrives at the cell port and is put in the CBR buffer before being sent to the cell bus. However, since one or more connections have not been given enough bandwidth, the traffic is not sent to the cell bus fast enough and the CBR input buffer overflows. This may cause the *CellPath* 300 to discard any arriving CBR traffic, which could result in output FIFO underflow at a CBR port (see Section 6.5.10). To troubleshoot this condition:

- Check all CBR connections configured on the cell port to ensure that they have been allocated adequate bandwidth. If any connections are found to have inadequate bandwidth, they should be reconfigured (see the *CellPath 300 ATM WAN Multiplexer Configuration Manual* for a formula for determining the correct bandwidth to use).

6.5.12 CELL: CBR Output FIFO Overflow
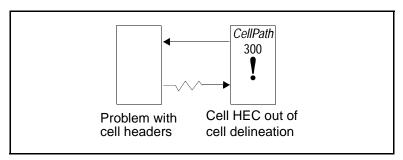
The cell port has been configured to pass more CBR traffic than it can physically handle. In other words, the aggregate bandwidth of the CBR connections exceeds the total bandwidth of the port. A cell port can be configured this way, however it only works if some of the connections are inactive at any given time. If this overflow occurs, it indicates that the cell port has been mistakenly over-subscribed with CBR connections, or that more connections than expected are simultaneously active.

Note that since CBR connections have first priority, this condition causes all of the output bandwidth to be consumed and any VBR connections configured on the port are not able to pass traffic out. To troubleshoot this condition:

- Remove CBR connections until the configured bandwidth is less than or equal to the total bandwidth on the port.

- If the port is over-subscribed and all CBR devices are using the connections, turn off some of the devices.

- If the CBR port connects with more bandwidth than a UNI can handle, remove connections until bandwidth subscription comes into compliance.

6.5.13 CELL: HEC Out of Cell Delineation

The *CellPath* 300 cannot find the cell boundaries and cannot read any cells.
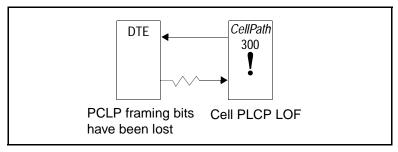
To troubleshoot this condition:

- Open the `Physical Statistics Report` for the port and look for evidence of a bad line. The incoming line may have a high error rate.
- The source device may have been mistakenly configured for PLCP cell delineation; switch the *CellPath* 300 configuration to PLCP to see if the alarm goes away. If so, the source is using PLCP framing.

If there is evidence of a bad line, the problem can be isolated using loopbacks. This message is valid only when HEC cell delineation is used.

6.5.14 CELL: PLCP Loss of Frame

This problem is typically caused by one of two situations: 1) the configuration settings on the *CellPath* 300 port are incorrect for the line, or 2) the port configuration is correct but the line is experiencing errors that result in a PLCP LOF alarm.

To troubleshoot this condition:
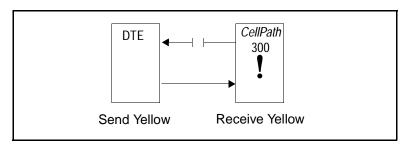
- Open the `Physical Statistics Report` for the port and look for evidence of a bad line. The incoming line may have a high error rate.

- The source may have been mistakenly configured for HEC cell delineation; switch the *CellPath* 300 configuration to HEC to see if the alarm goes away. If so, the source is using HEC framing.

If there is evidence of a bad line, isolate the problem on the line using loopbacks. This is valid only when PLCP cell delineation is used.

6.5.15 CELL: PLCP Receive Yellow Alarm

The far end is not receiving PLCP framing.
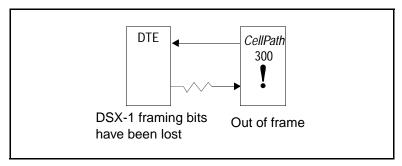
To troubleshoot this condition:

- Check the physical layer statistics and see if there is a yellow alarm condition there. If so, troubleshoot the physical layer first because it may resolve this problem.

- If PLCP fails, check for equipment malfunction. Test the *CellPath* 300 by connecting Tx to Rx (hard loopback) and seeing if the alarm goes away. If it does, the problem is elsewhere in the network.

This message is valid only when PLCP cell delineation is used.

6.5.16 DS1: Out of Frame

The out of frame (OOF) condition is typically caused by one of two situations: 1) the configuration settings on the *CellPath* 300 port are not correct for the line, or 2) the port configuration is correct but the line is experiencing errors that result in an OOF alarm.
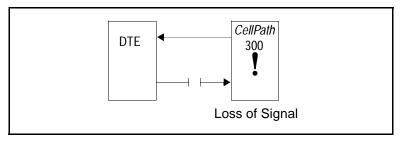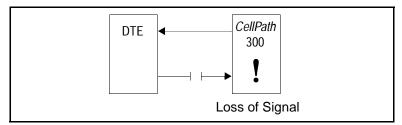
DTE

CellPath
300

DSX-1 framing bits
have been lost

Out of frame

To troubleshoot this condition:

- Check to see if the framing format configured on the port matches the framing format on the line. Try the other framing format and see if the alarm clears.
- Try changing the line build out setting.
- Open the statistics report for the port and look for evidence of a bad line. Bursts of LCVs could indicate a timing problem.

If there is evidence of a bad line, isolate the problem on the line using loopbacks.
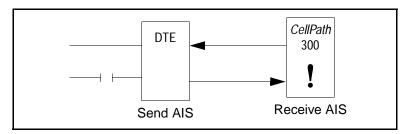
6.5.17 DS1: Loss of Signal
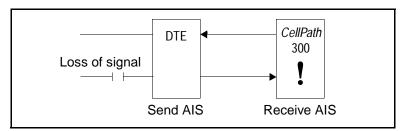
A loss of signal (LOS) condition occurs when the *CellPath* 300 cannot detect a signal at a configured port.

DTE

CellPath
300

Loss of Signal

To troubleshoot for this condition:

- Make sure that the cable between the *CellPath* 300 DSX-1 interface port and the T1 service provider's equipment, or T1 terminal equipment is correctly connected.
- If the cable was built on-site, check the connectors. A reversed transmit and receive pair, or an open receive pair, can cause this condition.
- If the above appear to be okay, check the T1 terminal equipment, or ask the T1 service provider to test the T1 line and correct any errors found.

6.5.18 DS1: Receive AIS

An incoming alarm indication signal (AIS) indicates a problem is occurring on the line upstream of the equipment connected to this port.
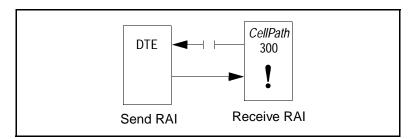
```
            ┌───────────────────────────────────────────┐
            │   ──────────┐ DTE  ◄──── ┌─CellPath─┐      │
            │             │            │   300    │      │
            │ Loss of     │            │    !      │      │
            │ signal ──┤ ├─│ ────►     │          │      │
            │          └──────┘        └──────────┘      │
            │        Send AIS          Receive AIS       │
            └───────────────────────────────────────────┘
```
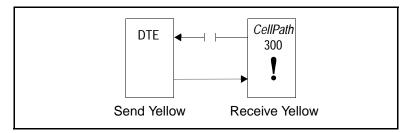
To troubleshoot this condition:

- Ask the T1 service provider to trace the source of the AIS signal.
- Check the status of the connected T1 terminal equipment.

6.5.19 DS1: Receive Yellow Alarm
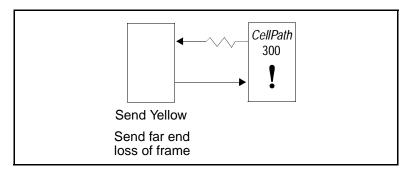
An incoming yellow condition at a DSX-1 interface indicates that the far end equipment has a problem with the signal it is receiving from the *CellPath* 300.

```
            ┌───────────────────────────────────────────┐
            │   ┌─DTE─┐ ◄──┤ ├── ┌─CellPath─┐            │
            │   │     │          │   300    │            │
            │   │     │  ────►    │    !     │            │
            │   └─────┘          └──────────┘            │
            │   Send Yellow      Receive Yellow          │
            └───────────────────────────────────────────┘
```

To troubleshoot this condition:

- Connect an external loopback cable to the *CellPath* 300 DSX-1 port. If the alarm goes away, the problem is elsewhere.
- Check for an open, short, or wiring error in the cable between the *CellPath* 300 network interface port and the service provider's network interface unit, or the T1 terminal equipment. An open transmit pair can cause this condition.

6.5.20 DS3: Far End Loss of Frame

The far end device cannot frame the signal being sent from the *CellPath* 300. Normally accompanied with a yellow alarm.
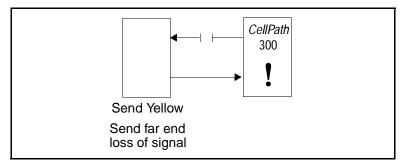
To troubleshoot this condition:

 •   The most likely cause of this problem is poor performance in the line attached to the transmit port. High error rate could be timing related.

If there is evidence of a bad line, isolate the problem on the line using loopbacks.

6.5.21 DS3: Far End Loss of Signal

The far end device has lost the signal being sent from the *CellPath* 300. Normally accompanied with a yellow alarm.
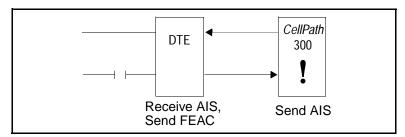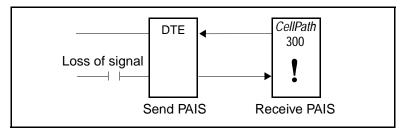

 To troubleshoot for this condition:

 •   Make sure that the cable between the DS3 interface port and the T3 service provider's equipment is properly connected.

- Make sure that the cables attached to transmit and receive ports are connected to receive and transmit ports, respectively, on other equipment. Connecting one transmit port to another, or leaving a transmit port open, can cause this condition.

- If the above appears to be okay, ask the T3 service provider to test the T3 line and correct any errors found.

6.5.22 DS3: Far End Receive AIS

The *CellPath* 300 has sent an alarm indication signal (AIS) to the far end device for some reason. This usually only happens when a port is powering up. The *CellPath* 300 may momentarily send AIS to the far end, in which case the far end sends a far end receive AIS back to the *CellPath* 300.
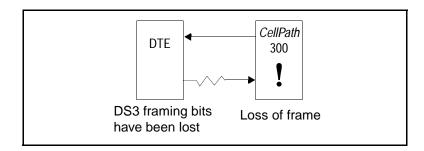
To troubleshoot this condition:

- If this alarm persists for more than a few seconds, there is a serious problem with the port and it should be removed and serviced.

6.5.23 DS3: Loss of Frame

The loss of frame (LOF) condition is typically caused by one of two situations: 1) the configuration settings on the *CellPath* 300 port are not correct for the line, or 2) the port configuration is correct but the line is experiencing errors that result in an LOF alarm.
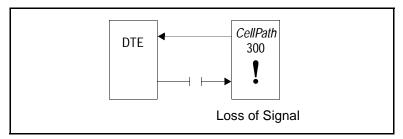
To troubleshoot an LOF condition:

- Check to see if the framing format configured on the port matches the framing format on the line.
- Open the statistics report for the port and look for evidence of a bad line. Bursts of LCVs could indicate a timing problem.
- If connected to local DS3 equipment, check that equipment's output level to make sure it is not overdriving the *CellPath* 300 DS3 input.

If there is evidence of a bad line, isolate the problem on the line using loopbacks.

6.5.24 DS3: Loss of Signal
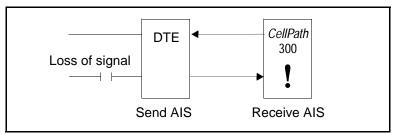
A loss of signal (LOS) condition occurs when the *CellPath* 300 cannot detect a signal at a configured port.

Loss of Signal

To troubleshoot for this condition:

- Make sure that the cable between the *CellPath* 300 DS3 interface port and the T3 service provider's equipment are properly connected.
- Make sure that the cables attached to transmit and receive ports are connected to receive and transmit ports, respectively, on the other equipment. Connecting one transmit port to another, or leaving a transmit port open, can cause this condition.
- If the above appears to be okay, ask the T3 service provider to test the T3 line and correct any errors found.

6.5.25 DS3: Receive AIS

An incoming alarm indication signal (AIS) indicates a problem is occurring on the line upstream of the equipment connected to this port.
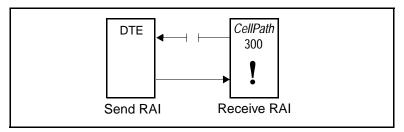

To troubleshoot this condition:

- Check the locally connected DS3 equipment, or ask the T3 service provider to trace the source of the AIS signal.
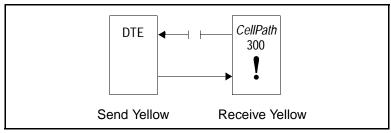
6.5.26 DS3: Receive Idle Signal

The idle signal indicates that the line has not been provisioned for service. No data passes on a line with an idle signal. To troubleshoot this condition:

- Check the configuration of the terminal equipment, or have the DS3 service provider check their equipment and make sure it is provisioned for service.

6.5.27 DS3: Receive Yellow Alarm
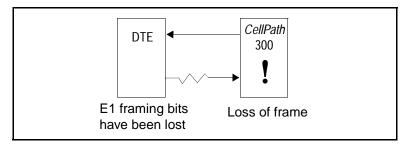
An incoming yellow condition (or remote alarm indication, RAI) at a DS3 interface indicates that the far end equipment has a problem with the signal it is receiving from the *CellPath* 300. A yellow alarm can only come from the device directly connected to the *CellPath* 300. If the *CellPath* 300 is connected to the far end equipment through several repeaters and the first repeater loses the signal from the *CellPath* 300, the repeater sends a yellow alarm to the *CellPath* 300. If the second repeater in the chain loses the signal from the first repeater, it sends a yellow alarm to the first repeater and the first repeater sends an AIS to the *CellPath* 300.

To troubleshoot this condition:

- Check for a defective cable between the *CellPath* 300 network interface port and the service provider's network interface unit. An open transmit line can cause this condition.

6.5.28 E1: Loss of Frame

The loss of frame (LOF) condition is typically caused by one of two situations: 1) the configuration settings on the *CellPath* 300 port are not correct for the line, or 2) the port configuration is correct but the line is experiencing errors that result in an LOF alarm.
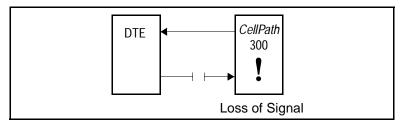
To troubleshoot an LOF condition:

- Check to see if the framing format configured on the port matches the framing format on the line.
- Open the statistics report for the port and look for evidence of a bad line. Bursts of LCVs could indicate a timing problem.

If there is evidence of a bad line, isolate the problem on the line using loopbacks.
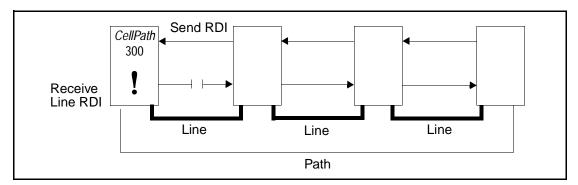
6.5.29 E1: Loss of Signal
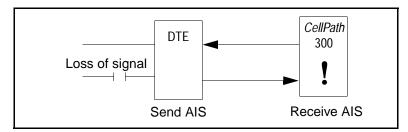
A loss of signal (LOS) condition occurs when the *CellPath* 300 cannot detect a signal at a configured port.

To troubleshoot for this condition:

- Make sure that the cable between the *CellPath* 300 E1 interface port and the local E1 equipment, or the E1 service provider's equipment are properly connected.

- Make sure that the cables attached to transmit and receive ports are connected to receive and transmit ports, respectively, on the other equipment. Connecting one transmit port to another, or leaving a transmit port open, can cause this condition.

- If the above appear to be OK, check the local E1 equipment, or ask the E1 service provider to test the E1 line and correct any errors found.

6.5.30 E1: Receive AIS

An incoming alarm indication signal (AIS) indicates a problem is occurring on the line upstream of the equipment connected to this port.
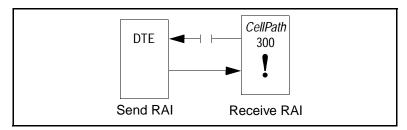
To troubleshoot this condition:

- Check the locally connected E1 equipment, or ask the E1 service provider to trace the source of the AIS signal.

6.5.31 E1: Receive RAI
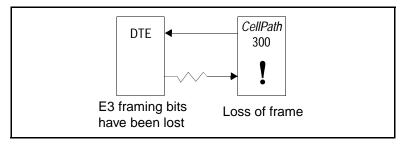
A remote alarm indication (RAI) at an E1 interface indicates that the far end equipment has a problem with the signal it is receiving from the *CellPath* 300.

To troubleshoot this condition:

- Check for a defective cable between the *CellPath* 300 network interface port and the service provider's network interface unit (i.e., NIU or smart jack). An open transmit line can cause this condition.
- Check Line Build Out (LBO) setting.

6.5.32 E3: Loss of Frame

An loss of frame (LOF) condition is typically caused by one of two situations: 1) the configuration settings on the *CellPath* 300 port are not correct for the line, or 2) the port configuration is correct but the line is experiencing errors that result in an LOF alarm.

To troubleshoot this condition:

- Check to see if the framing format configured on the port matches the framing format on the line.
- Open the statistics report for the port and look for evidence of a bad line. Bursts of LCVs could indicate a timing problem.

If there is evidence of a bad line, isolate the problem on the line using loopbacks.

6.5.33 E3: Loss of Signal

A loss of signal (LOS) condition occurs when the *CellPath* 300 cannot detect a signal at a configured port.

To troubleshoot this condition:

- Make sure that the cable between the *CellPath* 300 E3 interface port and the E3 service provider's equipment properly connected.

- Make sure that the cables attached to transmit and receive ports are connected to receive and transmit ports, respectively, on the other equipment. Connecting one transmit port to another, or leaving a transmit port open, can cause this condition.

- If the above appear to be okay, check the locally connected E3 equipment, or ask the E3 service provider to test the E3 line and correct any errors found.

6.5.34 E3: Receive AIS

An incoming alarm indication signal (AIS) indicates a problem is occurring on the line upstream of the equipment connected to this port.

To troubleshoot this condition:

- Check the locally connected E1 equipment, or ask the E1 service provider to trace the source of the AIS signal.

6.5.35 E3: Receive RAI

A remote alarm indication (RAI) at an E1 interface indicates that the far end equipment has a problem with the signal it is receiving from the *CellPath* 300.

To troubleshoot this condition:

- Check for a defective cable between the *CellPath* 300 network interface port and the service provider's network interface unit (i.e., NIU or smart jack). An open transmit line can cause this condition.
- Check Line Build Out (LBO) setting.

6.5.36 FRLM Service-Affecting Condition (Network or User Device)

A service-affecting condition is reported for either the network device and for user device operation when N392 (the error threshold) of the last N393 (monitored events count) are in error. This may be the result of a physical layer problem or a configuration mismatch between the neighboring devices. To troubleshoot this condition:

- Correct any physical layer problems.
- Verify that the FRLM configuration of the port (refer to the *CellPath 300 ATM WAN Multiplexer User's Manual*) and its neighboring device are compatible. Ensure that the polling timeout (T392) on the network device is longer than the polling interval (T391) on the user device.
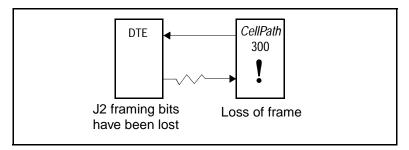
6.5.37 HSSI: Loss of Clock

The HSSI port has detected a Loss of Clock condition. To troubleshoot this condition:

- Check the cable pinouts

6.5.38 J2: Loss of Frame

A loss of frame (LOF) condition may exist if the line is experiencing errors that result in an LOF alarm.

To troubleshoot this condition:
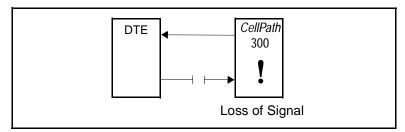
- Open the statistics report for the port and look for evidence of a bad line. Bursts of line code violations could indicate a timing problem or poor connection. Try increasing the receive input sensitivity.

- Check `Rcv Equalization` setting

If there is evidence of a bad line, isolate the problem on the line using loopbacks.

6.5.39 J2: Loss of Signal

A loss of signal (LOS) condition occurs when the *CellPath* 300 cannot detect a signal at a configured port.

Loss of Signal

To troubleshoot this condition:

- Make sure that the cable between the *CellPath* 300 J2 interface port and the J2 service provider's equipment are properly connected.

- Make sure that the cables attached to transmit and receive ports are connected to receive and transmit ports, respectively, on the other equipment. Connecting one transmit port to another, or leaving a transmit port open, can cause this condition.

- If the above appear to be okay, check the locally connected J2 equipment, or ask the J2 service provider to test the J2 line and correct any errors found.

6.5.40 J2: PAIS

A payload alarm indication signal (PAIS) at a J2 interface indicates a loss of the transmission capability of the 6,312 Kbps frame payload (time slots 1 through 96) in the network.
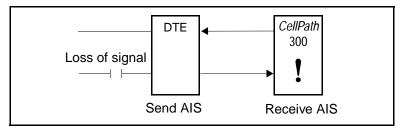
To troubleshoot this condition:

- Ask the J2 service provider to test the J2 line and correct any errors found.

6.5.41 J2: Receive AIS

An incoming alarm indication signal (AIS) indicates a problem is occurring on the line upstream of the equipment connected to this port.

To troubleshoot this condition:

- Check the locally connected J2 equipment, or ask the J2 service provider to trace the source of the AIS signal.

6.5.42 J2: Receive RAI

A remote alarm indication (RAI) at a J2 interface indicates that the far end equipment has a problem with the signal it is receiving from the *CellPath* 300.

To troubleshoot this condition:

- Check for a defective cable between the *CellPath* 300 network interface port and the service provider's network interface unit (i.e., NIU or smart jack). An open transmit line can cause this condition.
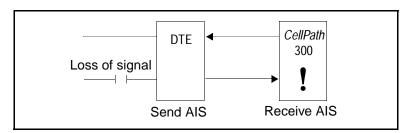
6.5.43 Link Down: AAL5 Interface

The IP over ATM (AAL5) connection is down.

- This condition is only caused by administratively disabling the interface. To re-enable the interface, change the *ifAdminStatus* MIB variable to "up".

6.5.44 OC-3c: AIS - Line

An incoming line alarm indication signal (AIS) indicates a problem is occurring on the line upstream of the equipment connected to this port. Line errors in OC-3c/STM1 are errors that happen between points in the network as opposed to path errors, which happen between "end points" in the network.
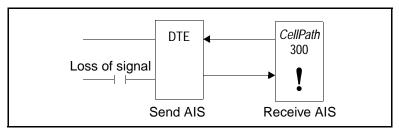
To troubleshoot this condition:

- Ask the OC-3c/STM1 service provider to trace the source of the AIS signal.

6.5.45 OC-3c: AIS - Path

An incoming path alarm indication signal (AIS) indicates a problem is occurring on the line upstream of the equipment connected to this port. Path errors in OC-3c/STM1 are errors that happen between "end points" in the network, as opposed to errors between muxes or repeaters. If an AIS - path alarm is received and an AIS - line alarm is not received, the equipment connected to the far end is receiving a bad signal.
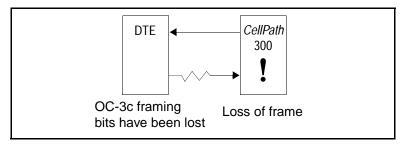
To troubleshoot this condition:

  • Investigate the equipment connected to the far end device.

6.5.46 OC-3c: Loss of Frame

The loss of frame condition (LOF) is typically caused by one of two situations: 1) the configuration settings on the *CellPath* 300 port are not correct for the line, or 2) the port configuration is correct but the line is experiencing errors that result in an LOF alarm.

To troubleshoot an LOF condition:

  • Check to see if the medium type configured on the port matches the framing format on the line.
  • Make sure that line scrambling is enabled.
  • Open the statistics report for the port and look for evidence of a bad line. Bursts of BIP errors could indicate a timing problem.

- Make sure the cable is made of the proper type of fiber.

If there is evidence of a bad line, isolate the problem on the line using loopbacks.

6.5.47 OC-3c: Loss of Pointer
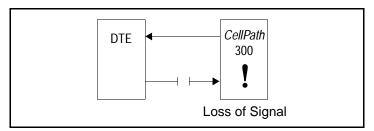
The loss of pointer (LOP) condition occurs when the *CellPath* 300 cannot detect the payload pointer in the OC-3c/STM1 signal. To troubleshoot LOP conditions:

- Check to see if the medium type configured on the port matches the framing format on the line.
- Open the statistics report for the port and look for evidence of a bad line. Bursts of BIP errors could indicate a timing problem.
- Make sure the fiber optic cable is connected to the correct type of PLM (single-mode or multimode).

If there is evidence of a bad line, isolate the problem on the line using loopbacks.

6.5.48 OC-3c: Loss of Signal

A loss of signal (LOS) condition occurs when the *CellPath* 300 cannot detect a signal at a configured port.

Loss of Signal

To troubleshoot for this condition:

- Make sure that connected the cable between the *CellPath* 300 OC-3c/STM1 interface port and the service provider's equipment are properly connected.
- If the cable was built on-site, check the cable connectors.
- If the above appear to be okay, ask the service provider to test the OC-3c/STM1 line and correct any errors found.

6.5.49 OC-3c: Remote Defect Indication - Line
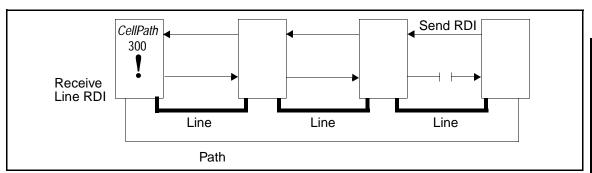
A remote defect indication condition at an OC-3c/STM1 interface indicates that equipment between the two network "end points" has lost its incoming signal. This message indicates that the problem lies between the *CellPath* 300 and the equipment that terminates the adjacent line for this connection.

To troubleshoot this condition:

- Check for a defective cable between the *CellPath* 300 network interface port and the service provider's network interface unit. An open transmit line can cause this condition.

- Make sure the OC-3c/STM1 single-mode laser is on and has not failed.

- Ask the OC-3c/STM1 service provider to track the error.

6.5.50 OC-3c: Remote Defect Indication - Path

A remote defect indication (RDI) at an OC-3c/STM1 interface indicates that the far end equipment has a problem with the signal it is receiving from the *CellPath* 300. This message indicates that the problem lies between the *CellPath* 300 and the terminal equipment for this connection, somewhere beyond the adjacent line.

To troubleshoot this condition:

- Check for a defective cable between the *CellPath* 300 network interface port and the service provider's network interface unit. An open transmit line can cause this condition.

6.5.51 PCMCIA Card Removed

The PCMCIA card has been removed and may have interrupted remote communications on the *CellPath* 300. To troubleshoot this condition:

- Reinstall a PCMCIA card to re-establish communications.

6.5.52 PLM Not Supported

The physical layer module in the card slot is not of a recognized type, or the hardware version is not compatible with the system software driver. To troubleshoot this condition:

- Check that the card is properly inserted in the slot.
- Use the `Module Information` screen to get the ID and hardware version of the card and the version number of the system software. Call FORE Systems' Technical Support.

6.5.53 PLM Removed

The physical layer module in the card slot has been removed. To troubleshoot this condition:

- Replace the PLM that was removed with one that is compatible with the currently- installed PM, and that has the appropriate revision level.

6.5.54 PM Not Supported

The protocol module installed in the card slot is not of a recognized type, or the hardware version is not compatible with the system software driver. To troubleshoot this condition:

- Check that the card is properly inserted in the slot.
- Use the `Module Information` screen to get the ID and hardware version of the card and the version number of the system software. Call FORE Systems' Technical Support.

6.5.55 PM Invalid Port Configuration

The protocol module port type configuration is invalid. To troubleshoot this condition:

- Verify the port configuration type.

6.5.56 PM/PLM Config Mismatch

The protocol/physical layer module pair is compatible, but the card slot was previously occupied by some other protocol/physical layer module pair for which the system is retaining port settings and/or connections. To troubleshoot this condition:

- Make sure the proper pair of protocol module and physical layer module cards are installed in the correct front and rear slots.
- In the *CellPath* 300 `System Configuration` screen, move the cursor to the line containing the slot in which the protocol module or physical layer module has been replaced, and press `<ENTER>`. A dialog box appears, asking to confirm a default reconfiguration of the new module. (Effectively, this discards all setting and connection information for the old module.) Select `[Confirm]` and press `<ENTER>` to reconfigure; select `[Cancel]` and press `<ENTER>` if the old module is to be inserted back in the slot—as, for example, a module was removed by mistake.

6.5.57 PM/PLM Fault Detected

It has been too long since the protocol/physical layer module pair has responded to an internal system message. The module pair has been reset. If this event occurs five times in an interval, the module pair is declared inoperable. To troubleshoot this condition:

- Remove and re-insert the cards to see if the error is a transitory anomaly.

- If backup protocol/physical layer modules are available, remove the modules on which the fault was detected and insert the backup ones.

- If the condition persists, contact FORE Systems for servicing instructions for the faulty modules.

6.5.58 PM/PLM Hardware Revision Mismatch

The hardware revision level of the protocol module or the physical layer module installed in this slot is not capable of supporting some aspect of the configuration stored for this slot. To troubleshoot this condition:

- Verify the options for which this module is configured.

- Verify the PM and PLM revision levels. Replace the module that is causing the error.

6.5.59 PM/PLM Illegal Combination

The protocol module/physical layer module pairing is not compatible. To troubleshoot this condition:

- Remove either the protocol module or the physical layer module and replace it with a compatible module.

6.5.60 PM/PLM No Bandwidth Available

The *CellPath* 300 has a fixed amount of cell bus bandwidth for passing data between ports. For each module that is installed in the *CellPath* 300, cell bus bandwidth is allocated to handle the traffic passing through the port or ports on the module.

If a combination of modules is inserted such that the bandwidth consumed exceeds the available cell bus bandwidth (for instance, four OC3-/STM1 boards), the *CellPath* 300 will not configure bandwidth on the cell bus for some of the modules and the ports on those modules will not work. In this case, for each module, the message "! No Bandwidth Available" appears and the LEDs on the module are off. Any module that appears in the `System Configuration` screen with its normal name has properly-assigned bandwidth and will function normally. To troubleshoot this condition:

- Remove one of the modules from the chassis until all remaining modules are accepted by the *CellPath* 300 and function properly.

6.5.61 PM/PLM Slot Dead

The system has determined that one or both of the cards in the protocol module/physical layer module pair have failed to the point of being unusable. The system removes these modules from service. To troubleshoot this condition:

- Remove and re-insert the cards to see if the error is a transitory anomaly.
- If backup protocol/physical layer modules are available, remove the old modules and insert the backup ones.
- Contact FORE Systems for servicing instructions for the faulty modules.

6.5.62 System: Double Fan Failure

Both of the chassis cooling fans are running too slowly or have failed, or the fan tray is not present. To troubleshoot this condition:

- Check the upper rear of the chassis for the presence of the fan tray.
- Remove the fan tray, check to see if anything is obstructing the movement of the fans.

6.5.63 System: Lower PS Failed

This indicates there is a problem with the power coming into the supply or a problem with the supply itself. To troubleshoot this condition:

- Check the power coming into the supply. If the power is okay, then the problem is with the power supply. Remove the power supply and contact FORE Systems' Technical Support.
- Replace the fan tray with a spare fan tray.

6.5.64 System: Reference Clock

System Reference Clock PRI/SEC/Curr = x/y/z. To troubleshoot this condition:

- Verify the reference clock settings.

6.5.65 System: Single Fan Failure

One of the two chassis cooling fans located in the fan tray is running too slowly or has failed. To troubleshoot this condition:

- Remove and re-insert the fan in the fan tray.
- Check to see if anything is obstructing the movement of the fan.
- Replace the fan tray with a spare.

6.5.66 System: Upper PS Failed

This indicates there is a problem with the power coming into the supply or a problem with the supply itself. To troubleshoot this condition:
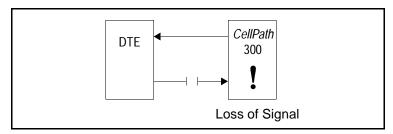
- Check the power coming into the supply. If the power is okay, then the problem is with the power supply. Remove the power supply and contact FORE Systems' Technical Support.

6.5.67 V.35/EIA: Loss of Clock

The V.35/EIA-530 port has detected a Loss of Clock condition.

6.5.68 V.35/EIA: Loss of Signal

A loss of signal (LOS) condition occurs when the *CellPath* 300 cannot detect the assertion of the expected DTR and/or RTS control signal at a configured port.

To troubleshoot for this condition:

- Check the LOS configuration in the `Port Configuration` screen.
- Make sure that the cable between the *CellPath* 300 V.35/EIA-530 interface port and the DTE is properly connected.
- If the cable was built on-site, check the cable pinouts.
- Verify that the DTE is asserting the expected control signals.

6.5.69 VBR: Packet Input Buffer Overflow

The input buffer on the packet port has overflowed. This has caused some cells to be discarded. To troubleshoot this condition:

- Check the *CellPath* 300 VBR/packet port and make sure the clock rate and bandwidth are set correctly.

- If the interface is V.35/EIA-530, the port can be configured to use flow control, which signals the device sending the packets to halt transfer when the overflow situation approaches.

- Check the size of the packets coming into the port. Continuous streams of packets smaller than 646 bytes can cause problems, because packet segmentation can leave cells that are mostly empty, resulting in lower effective cell utilization for these shorter packets. This can increase the required cell rate of the connection beyond what the packet port's segmentation processor can support. Reconfigure the sending equipment to use larger-sized packets if possible, or reduce the port clock rate.

CHAPTER 7   Loopbacks

This chapter describes the loopbacks that can be set on the *CellPath* 300 physical module inter-
faces. Topics include the following:

- OC-3c loopbacks (page 7-11)
- Testing OC-3c / STM1 connections using error insertions (page 7-13)
- DS3 loopbacks (page 7-15)
- E3 loopbacks (page 7-18)
- J2 loopbacks (page 7-21)
- DS1 / DSX-1 loopbacks (page 7-25)
- E1 loopbacks (page 7-29)
- V.35 / EIA-530 loopbacks (page 7-32)
- HSSI loopbacks (page 7-35)

Loopbacks

7.1   Introduction to Loopbacks

A loopback is a point in a communications network at which an incoming signal is "looped" and returned along its transmit path. Loopbacks are frequently used in testing network connections.

Loopbacks are primarily used to verify that the connection path between two devices in a network is functioning correctly.

Three kinds of loopbacks can be configured on *CellPath* 300 ports:

- Line loopbacks
- Payload loopbacks
- Local loopbacks

A port can have only one type of loopback configured on it at a time.

The three types of configured loopbacks differ in: (1) the direction from which they enter and exit the port, and (2) the amount by which the signal penetrates the port before being looped back.

For example, consider the illustration in Figure 7.1, showing normal data flow through the *CellPath* 300 between two ports containing framer circuitry, which removes and inserts framing bits as data enters and exits the *CellPath* 300.
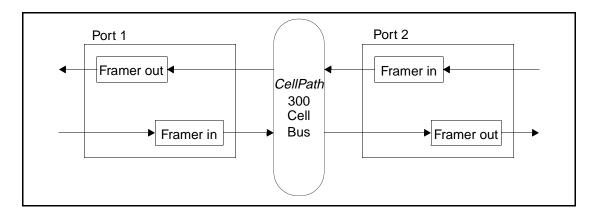
Figure 7.1 - Normal (Non-Loopbacked) Data Flow

Data normally flows through the *CellPath* 300 by coming in one port, going through the *CellPath* 300 cell bus, and going out another port. Data coming into the input port has its framing bits removed and is sent on to the *CellPath* 300 cell bus; data to be output by a port has framing bits inserted, and is sent on to the next device.

7.1.1   Line Loopbacks

When a port is configured for line loopback (see Figure 7.2), data coming into the port from outside the *CellPath* 300 is immediately looped back. Data is also passed through to the *CellPath* 300 cell bus, and on to the output port. Data coming from the *CellPath* 300 cell bus (i.e., from another port) to be output by the looped-back port is lost.
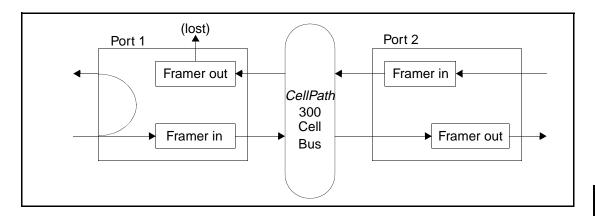
Figure 7.2 - Line Loopback Data Flow

In general, line loopbacks feature minimal penetration of the *CellPath* 300; data does not go through any framer circuitry, framing bits are not stripped off, and the payload is not re-framed.

Loopbacks

7.1.2   Payload Loopbacks

Payload loopbacks work the same as line loopbacks, except incoming data goes through the port's framing circuitry (framing bits are stripped off incoming data and payload is re-framed) before being looped back (see Figure 7.3). Data coming into the port from the network is also passed through to the *CellPath* 300 cell bus. Data coming from the *CellPath* 300 cell bus to be output by the looped-back port is lost.

> **NOTE**   On the *CellPath* 300, only DSX-1 ports support payload loopbacks.
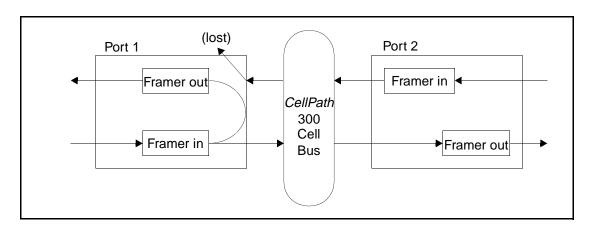
Figure 7.3 - Payload Loopback Data Flow

7.1.3   Local Loopbacks

Local loopbacks check the correctness of the data path on its way through the *CellPath* 300.

When a port is configured for local loopback mode (`Port 2` in Figure 7.4), data coming into the port from the *CellPath* 300 cell bus (i.e., data destined to be output by the port) is looped back into the *CellPath* 300, in addition to being passed through and output to the network. Data being input to the port is lost.
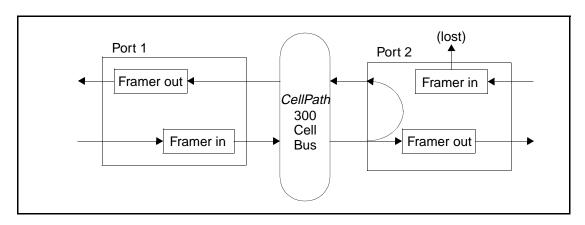
Figure 7.4 - Local Loopback Data Flow

7.1.4   Connection Loopbacks

In addition to the "configured" loopbacks (line, payload, and local), it is also possible to set up a pseudo-loopback called a "connection" loopback. This can be done in the ATM Connections form by simply setting up a connection where the A side has the same port as the B side.
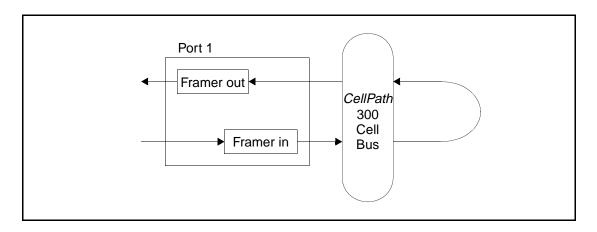
Figure 7.5 - Connection Loopback Data Flow

When a signal travels down a path that has a connection loopback on it, the signal is input at one port, goes through the *CellPath* 300 cell bus, and exits out the same port. Any processing that would normally be performed on a non-loopbacked signal (e.g., framing bits removal/insertion/segmentation/reassembly) is performed on signals flowing through a connection loopback.

> **NOTE** ►
>
> When setting up a loopback connection, the desired bandwidth must be specified in the A-to-B direction, and zero bandwidth in the B-to-A direction on the ATM Connections form.

7.2   Testing Connections Using Loopbacks

The strategy for testing network connections involves setting a loopback at one point in a data path and sending a test signal to see if it comes back correctly. If it does, another loopback is set farther down the data path and the test signal is sent again. Repeat the procedure until the faulty connection is located, or until all the connections in the data path are confirmed.

Testing data path connections using loopbacks is essentially a two-step process:

1. Set a loopback at some point in the data path.

2. Send a signal from some other piece of equipment toward the loopback, and see if the signal comes back correctly.

If the signal comes back correctly, it can be concluded that the connections in the data path are functioning properly between the equipment that sent the signal and the point at which the loopback was set. Remove the original loopback, and set up another loopback farther down the data path. Send another signal, examine results, etc., and continue this process until the point of failure in the data path has been isolated or it is determined that all connections are operating correctly.

NOTE ➤ Some types of signals may not be processed successfully when looped back to the sender. Certain frame headers, for example, have bits indicating the direction of flow. The DTE may be sensitive to this, and may discard the looped frames when they are returned.

However, if a connection loopback is used, or a local loopback on another port, then such a frame is regenerated at the packet port, with the directional indication flagged properly.

7.2.1   Example

Consider the portion of a data path shown in Figure 7.6, showing some data terminal equipment connected through a *CellPath* 300 to a communications network.

If this network were to experience a problem, first determine whether or not the problem is inside the *CellPath* 300 (e.g., a mismatched connection, a faulty board, etc.) or external to the *CellPath* 300. The following procedure might be used:

1. Connect a loopback cable to the DTE. If the test signal comes back correctly, access to the *CellPath* 300 is verified; otherwise, the DTE is configured incorrectly or corrupting data.

2. Configure the *CellPath* 300 input port connected to the DTE to be in line loopback mode, then send the *CellPath* 300 a test signal. If the test signal comes back correctly, data is getting to the input port correctly; if not, the data is being corrupted before it gets to the *CellPath* 300 physical layer module line interface (input port). The cabling is correct; therefore, the problem lies at a higher level.
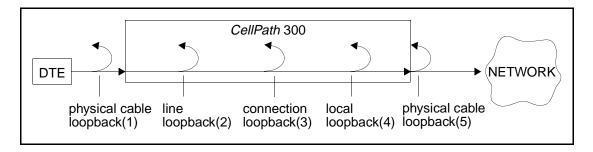
Figure 7.6 - Portion of Network, Showing Locations of Data Loopback

3. Put the input port back into normal mode, set up a connection loopback between the data terminal device and the *CellPath* 300, then send the *CellPath* 300 a test signal. If the test signal comes back correctly, data is getting through the input port to the *CellPath* 300 cell bus correctly; if not, there is a problem inside the *CellPath* 300, between the input port and *CellPath* 300 cell bus. The cabling, port configuration, and ATM connection parameters are correct.

4. Restore the previous connection, put the output port into local loopback, and send the *CellPath* 300 a test signal. If the test signal comes back correctly, data is going through the *CellPath* 300 to the output port correctly; if not, there is a problem inside the *CellPath* 300, between the *CellPath* 300 cell bus and the output port (most likely incorrect ATM connection parameters).

5. Connect a loopback cable to the output port of the *CellPath* 300. If the test signal comes back correctly, then the path through the *CellPath* 300 is good; if not, the problem is in the output port's physical layer module configuration or hardware.

It is important to consider the nature of the test signal generated by the DTE when deciding which of these steps are applicable to the situation. For example, not all DTEs capable of generating packets can be coerced into sending test packets addressed to themselves.

NOTE ▶ Setting a line, payload, or local loopback on a port capable of multiple connections affects all traffic flowing on the connections configured on that port, whereas setting up a connection loopback only affects the traffic flowing on the one connection.

7.3 Setting *CellPath* 300 Loopbacks

Three types of loopbacks can be configured on *CellPath* 300 ports: line loopbacks, payload loopbacks, and local loopbacks.

7.3.1 Activating Loopbacks via the User Interface

To put a port into loopback mode, open that port's configuration form and select the `Port Loopback` parameter as shown in Figure 7.7. Set the loopback parameter, as appropriate.

```
┌──────────────── Slot 3 - Cell / OC-3 Single mode ─────────────┐
│                                                NEW [ Events... ]   ... ]
│ Syst │ Port:                       3:1
│ Syst │ Port Name:
│ Syst │ Circuit Identifier:         No circuit identifier set.
│ Soft │ Port Alarms                 Mode: Standby  Status: Errors
│ Syst │ Medium Type:                SONET
│ PCMC │ Port Laser                  Mode: Off    Status: Off
│ Powe │ PathWidth:                  sts3cSTM1
│      │ Port Tx Clock:              System Clk
│ [ Sy │ Scrambling                  ATM Payload: On   SONET: On
│ [ Co │ OAM Cell Generation:        Disabled
│      │ Port LoopBack:              Line
│ Slot │          Sect BIP-8:        Off
│ Slot │   Error  Line BIP-24:       Off
│ Slot │ Insertion Path BIP-8:       Off
│ Slot │          Line AIS:          Off
│ Slot │          Path AIS:          Off               1 PLM
│ Slot │ [ Connections... ]
│ Slot │ [ ATM Stats... ]
│ Slot │ [ OC-3 Stats... ]
│                      [ ^Apply ]  [ ^OK ]  [ ^Cancel ]
│ LoopBack test, <Space> bar toggles choices ...
```

Figure 7.7 - Location of Port Loopback Parameter

> **NOTE** Not every port type supports all types of loopbacks. Check the description of the port to find out what kinds of loopbacks are supported for it.

To take a port out of loopback mode, bring up the port's configuration form, select the `Port Loopback` parameter, and set it to `None`.

7.3.2   Activating Loopbacks via Remote Connection

Line loopbacks can be activated or deactivated on certain port types by sending the port a message through the remote connection.

DS3 ports go into line loopback mode when they receive a Line Loop Activate FEAC message, and go out of line loopback mode when they receive a Line Loop Deactivate message. Loss of signal alarms, loss of frame alarms, or "blue" (Alarm Indication Signal) alarms deactivate any loopbacks initiated by a remote connection.

V.35 ⁄ EIA-530 ports go into line loopback mode when the port detects the LL(141) signal as on, and exit line loopback mode when the port detects the LL(141) signal as off.

7.4   OC-3c Loopbacks

The OC-3c physical layer supports line and local loopbacks.

7.4.1   Line Loopbacks

- Loops received data to transmitted data after O∕E (optical∕electrical) conversion.
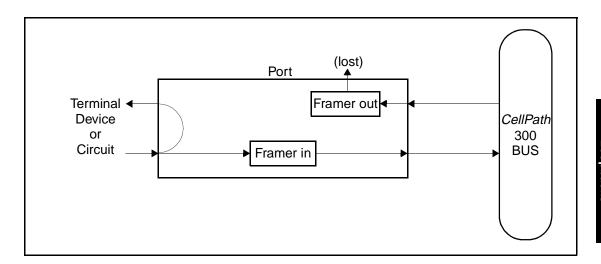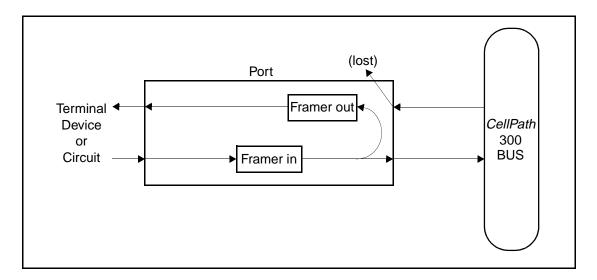- Data input to the port is passed to the *CellPath* 300 bus; data coming from the *CellPath* 300 bus is lost.
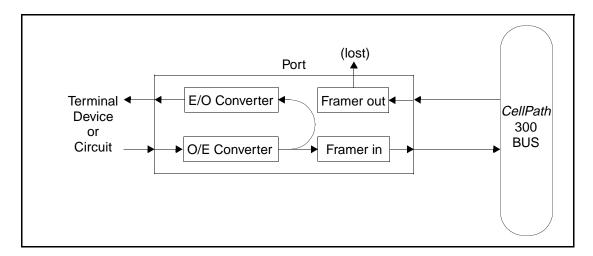
Figure 7.8 - Line Loopback, OC-3c

7.4.2   Local Loopbacks

- Loops data from the *CellPath* 300 bus back to its source.
- Configure appropriate connections to use this loopback.
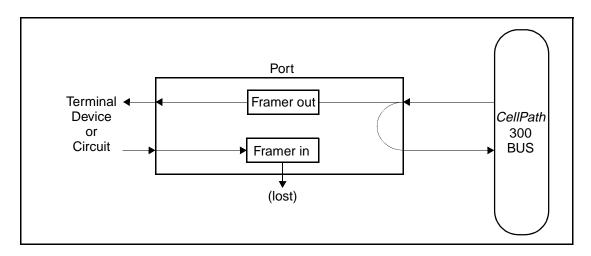- Data from the *CellPath* 300 bus is passed through; data input to the port is lost.
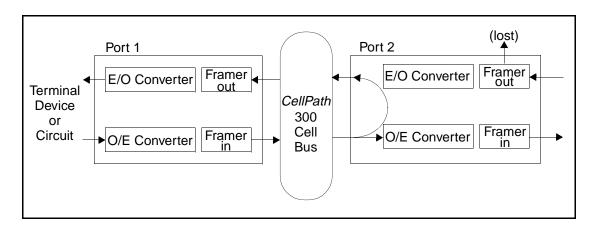
Figure 7.9 - Local Loopback, OC-3c

7.4.3   Setting Loopbacks

Set an OC-3c port into line loopback mode by:

- Selecting `Line` for the `Port Loopback` option in the `Port Configuration` form
- Setting the `kfxSonetLoopback` instance to `line` via the SNMP agent

Set an OC-3c port into local loopback mode by:

- Selecting `Local` for the `Port Loopback` option in the `Port Configuration` form
- Setting the `kfxSonetLoopback` instance to `local` via the SNMP agent

Remove all loopbacks from an OC-3c port by:

- Selecting `None` for the `Port Loopback` option in the `Port Configuration` form
- Setting the `kfxSonetLoopback` instance to `none` via the SNMP agent

A line loopback and a local loopback cannot be activated on the same port simultaneously.

7.5 Testing OC-3c/STM1 Connections Using Error Insertions

Use the error insertion fields of the OC-3c port configuration form to test OC-3c networks.

The port configuration form fields labeled `Sect BIP-8`, `Line BIP-24`, `Path BIP-8`, `Line AIS`, and `Path AIS` can be used to test portions of an OC-3c network. The OC-3c should not be in loopback mode when any of these fields are set to `ON`.

```
╔══════════════════ Slot 3 - Cell / OC-3 Single mode ═══════════╗
                                                NEW [ Events... ]     ... ]
 Syst│ Port:                  3:1
 Syst│ Port Name:
 Syst│ Circuit Identifier:    No circuit identifier set.
 Soft│ Port Alarms            Mode: Standby  Status: Errors
 Syst│ Medium Type:           SONET
 PCMC│ Port Laser             Mode: Off     Status: Off
 Powe│ PathWidth:             sts3cSTM1
      │ Port Tx Clock:         System Clk
 [ Sy│ Scrambling             ATM Payload: On    SONET: On
 [ Co│ OAM Cell Generation:   Disabled
      │ Port LoopBack:         Line
 Slot│          Sect BIP-8:   On
 Slot│  Error   Line BIP-24:  On
 Slot│ Insertion Path BIP-8:  Off
 Slot│          Line AIS:     On                                1 PLM
 Slot│          Path AIS:     Off
 Slot│ [ Connections... ]
 Slot│ [ ATM Stats...    ]
 Slot│ [ OC-3 Stats...   ]
                          [ ^Apply ]  [ ^OK ]  [ ^Cancel ]
 <Space> bar toggles choices ...
```

Figure 7.10 - Error Insertion Fields in OC-3c Port Configuration Form

7.5.1 OC-3c Network Terminology Hierarchy

An OC-3c network consists of paths, lines, and sections:

- • A path is a sequence of connections from one DTE to another DTE.
- • A line is a sequence of connections delimited by DTEs or muxes.
- • A section is a connection between any two nodes in the network, whether DTEs, muxes, or repeaters.
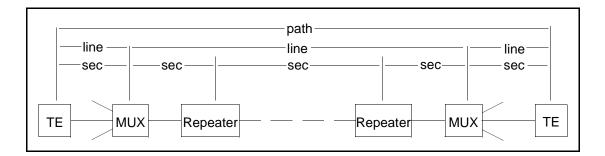
Figure 7.11 - OC-3c Network Terminology Hierarchy

7.5.2 BIP Error Insertion

Setting one of the BIP error insertion parameters to On inserts a parity error into the data stream being output by the OC-3c port:

- Sect BIP-8 inserts a parity error into each B1-byte that should be seen at the next section boundary.
- Line BIP-24 inserts a parity error into each B2-byte grouping in the line overhead bits that should be seen at the next line boundary.
- Path BIP-8 inserts a parity error into each B3-byte that should be seen for the length of the entire path.

7.5.3 AIS Error Insertion

Setting one of the AIS error insertion parameters to On inserts an alarm indicator into the data stream being output by the OC-3c port:

- Line AIS inserts an alarm indicator that should be seen at the next line boundary.
- Path AIS inserts an alarm indicator that should be seen for the length of the entire path.

7.6   DS3 Loopbacks

The DS3 physical layer supports line and local loopbacks.

7.6.1   Line Loopbacks

- Connects the received data stream after B8ZS decoding to the input of the DS3 framer.

- Data input to the port is passed to the *CellPath* 300 bus; data coming from the *CellPath* 300 bus is lost.
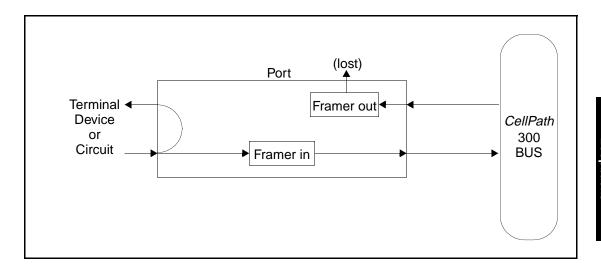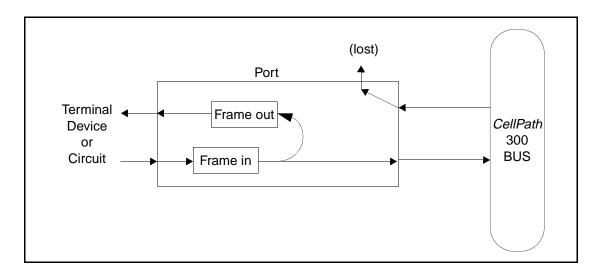

Figure 7.12 - Line Loopback, DS3

7.6.2   Local Loopbacks

- Loops data from the *CellPath* 300 bus back to its source.
- Configure appropriate connections to use this loopback.
- Data from the *CellPath* 300 bus is passed through; data input to the port is lost.
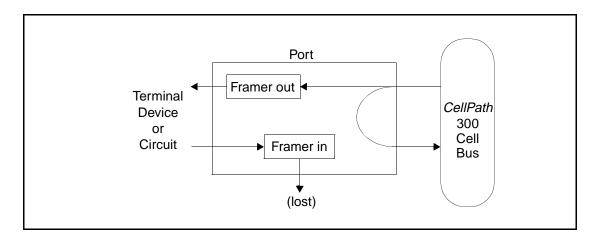
Figure 7.13 - Local Loopback, DS3

7.6.3   Setting Loopbacks

Set a DS3 port into line loopback mode by:

- Sending the Line Loopback Activate C-Bit Parity FEAC message
- Selecting `Line` for the `Port Loopback` option in the `Port Configuration` form
- Setting the `dsx3LoopbackConfig` instance to `dsx3LineLoop` via the SNMP agent

Set a DS3 port into local loopback mode by:

- Sending the `Line` Loopback Deactivate C-Bit Parity FEAC message
- Selecting `Local` for the `Port Loopback` option in the `Port Configuration` form
- Setting the `dsx3LoopbackConfig` instance to `dsx3OtherLoop` via the SNMP agent

Remove all loopbacks from a DS3 port by:

- Selecting `None` for the `Port Loopback` option in the `Port Configuration` form

- Setting the `dsx3LoopbackConfig` instance to `dsx3NoLoop` via the SNMP agent

A line loopback and a local loopback cannot be activated on the same port simultaneously.

Loopbacks

7.7   E3 Loopbacks

The E3 physical layer supports line and local loopbacks.

7.7.1   Line Loopbacks

- Connects the received data stream after B3ZS decoding to the input of the E3 framer.
- Data input to the port is passed to the *CellPath* 300 bus; data coming from the *CellPath* 300 bus is lost.
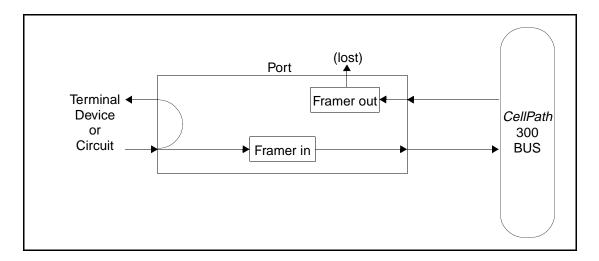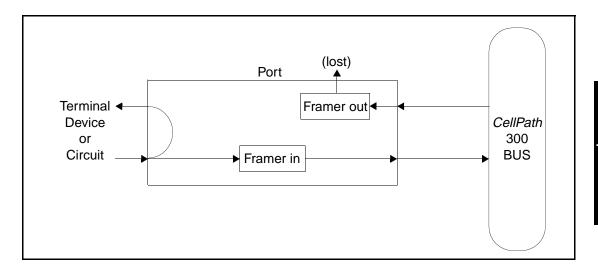
Figure 7.14 - Line Loopback, E3

7.7.2   Local Loopbacks

- Loops data from the *CellPath* 300 bus back to its source.
- Configure appropriate connections to use this loopback.
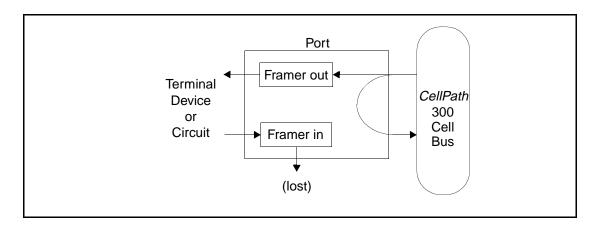- Data from the *CellPath* 300 bus is passed through; data input to the port is lost.
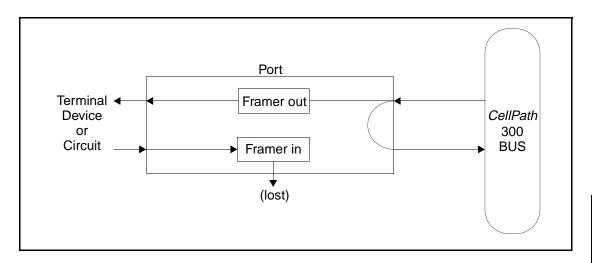
Figure 7.15 - Local Loopback, E3

7.7.3   Setting Loopbacks

Set an E3 port into line loopback mode by:

- Selecting `Line` for the `Port Loopback` option in the `Port Configuration` form
- Setting the `dsx3LoopbackConfig` instance to `dsx3LineLoop` via the SNMP agent

Set an E3 port into local loopback mode by:

- Selecting `Local` for the `Port Loopback` option in the `Port Configuration` form
- Setting the `dsx3LoopbackConfig` instance to `dsx3OtherLoop` via the SNMP agent

Loopbacks

Remove all loopbacks from an E3 port by:

- Selecting `None` for the `Port Loopback` option in the `Port Configuration` form
- Setting the `dsx3LoopbackConfig` instance to `dsx3NoLoop` via the SNMP agent

A line loopback and a local loopback cannot be activated on the same port simultaneously.

7.8   J2 Loopbacks

The J2 physical layer supports line, payload, and local loopbacks.

7.8.1   Line Loopbacks

- Connects the received data stream after B8ZS decoding to the input of the J2 framer.

- Data input to the port is passed to the *CellPath* 300 bus; data coming from the *CellPath* 300 bus is lost.

Figure 7.16 - Line Loopback, J2

7.8.2   Payload Loopbacks

- Takes incoming data, corrects corrupted data indications such as CRC-5 and B8ZS errors, re-frames the data, then loops data back to the transmit side of the line.

- Data input to the port is passed to the *CellPath* 300 bus; data coming from the *CellPath* 300 bus is lost.

Figure 7.17 - Payload Loopback, J2

7.8.3   Local Loopbacks

- Loops data from the *Cellpath* 300 back to its source.
- The appropriate connections must be configured to use this loopback.
- Data from the *CellPath* 300 bus is passed through; data input to the port is lost.

Figure 7.18 - Local Loopback, J2

7.8.4   Setting Loopbacks

A J2 port can be set into line loopback mode by:

- Selecting `Line` for the `Port Loopback` option in the `Port Configuration` form
- Setting the `j2LoopbackConfig` instance to `j2LineLoop` via the SNMP agent

A J2 port can be set into payload loopback mode by:

- Selecting `Payload` for the `Port Loopback` option in the `Port Configuration` form
- Setting the `j2LoopbackConfig` instance to `j2PayloadLoop` via the SNMP agent

A J2 port can be set into local loopback mode by:

- Selecting `Local` for the `Port Loopback` option in the `Port Configuration` form
- Setting the `j2LoopbackConfig` instance to `j2OtherLoop` via the SNMP agent

All loopbacks can be removed from a J2 port by:

- Selecting `None` for the `Port Loopback` option in the `Port Configuration` form
- Setting the `j2LoopbackConfig` instance to `j2NoLoop` via the SNMP agent

Two types of loopbacks cannot be activated on the same port simultaneously.

7.9   DS1/DSX-1 Loopbacks

Loopbacks are the same for the IMA DS1 interface and the Quad Port DSX-1 interface. (When the IMA Group Loopback field is set to run loopbacks, all links in the group are looped back.) The DSX-1 physical layer supports line, payload, and local loopbacks.

7.9.1   Line Loopbacks

- Takes received data and loops it directly back to the transmit side of the line.

- Data input to the port is passed to the *CellPath* 300 bus; data coming from the *CellPath* 300 bus is lost.
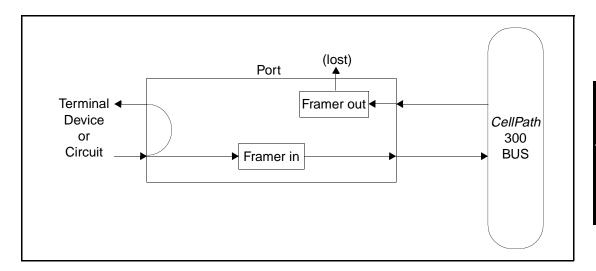
Figure 7.19 - Line Loopback, DS1 ⁄ DSX-1

7.9.2   Payload Loopbacks

- Takes incoming data, corrects BPV errors, removes FPS framing pattern, CRC6 calculation, and FDL bits, and reinserts correct ones, then loops data back to the transmit side of the line.

- Data input to the port is passed to the *CellPath* 300 bus; data coming from the *CellPath* 300 bus is lost.

Figure 7.20 - Payload Loopback, DS1/DSX-1

7.9.3   Local Loopbacks

- Loops data from the *CellPath* 300 bus back to its source.
- Configure appropriate connections to use this loopback.
- Data from *CellPath* 300 bus is passed through; data input to the port is lost.
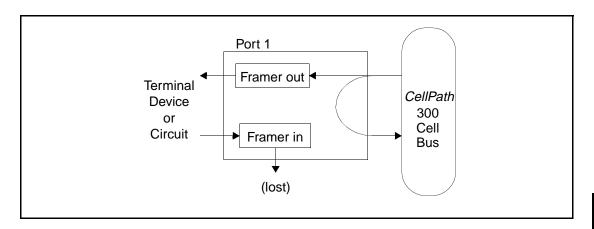
Figure 7.21 - Local Loopback, DS1/DSX-1

7.9.4   Setting Loopbacks

Use one of these methods to set a line loopback on a DS1/DSX-1 port:

- Selecting `Line` for the `Port Loopback` option in the `Port Configuration` screen
- Setting the `dsx1LoopbackConfig` instance to `dsx1LineLoop` via the SNMP agent

Use one of these methods to set a payload loopback on a DS1/DSX-1 port:

- Selecting `Payload` for the `Port Loopback` option in the `Port Configuration` screen
- Setting the `dsx1LoopbackConfig` instance to `dsx1PayloadLoop` via the SNMP agent

Loopbacks

Use one of these methods to set a local loopback on a DS1/DSX-1 port:

- Selecting `Local` for the `Port Loopback` option in the `Port Configuration` screen
- Setting the `dsx1LoopbackConfig` instance to `dsx1OtherLoop` via the SNMP agent

Use one of these methods to remove all loopbacks from a DSX-1 port:

- Selecting `None` for the `Port Loopback` option in the `Port Configuration` screen
- Setting the `dsx1LoopbackConfig` instance to `dsx1NoLoop` via the SNMP agent

Two types of loopbacks cannot be activated on the same port simultaneously.

7.10 E1 Loopbacks

Loopbacks are the same for the IMA E1 interface and the Quad Port E1 interface. (When the IMA Group Loopback field is set to run loopbacks, all links in the group are looped back.) The E1 physical layer supports line and local loopbacks.

7.10.1 Line Loopbacks

- Takes received data and loops it directly back to the transmit side of the line.
- Data input to the port is passed to the *CellPath* 300 bus; data coming from the *CellPath* 300 bus is lost.

Figure 7.22 - Line Loopback, E1

7.10.2 Local Loopbacks

- Loops data from the *CellPath* 300 bus back to its source.
- Configure appropriate connections to use this loopback.
- Data from the *CellPath* 300 bus is passed through; data input to port is lost.

Figure 7.23 - Local Loopback, E1

7.10.3 Setting Loopbacks

Use one of these methods to set a line loopback on an E1 port:

- Selecting `Line` for the `Port Loopback` option in the `Port Configuration` form
- Setting the `dsx1LoopbackConfig` instance to `dsx1LineLoop` via the SNMP agent

Use one of these methods to set a local loopback on an E1 port:

- Selecting `Local` for the `Port Loopback` option in the `Port Configuration` form
- Setting the `dsx1LoopbackConfig` instance to `dsx1OtherLoop` via the SNMP agent

Use one of these methods to remove all loopbacks from an E1 port:

- Selecting `None` for the `Port Loopback` option in the `Port Configuration` form
- Setting the `dsx1LoopbackConfig` instance to `dsx1NoLoop` via the SNMP agent

Two types of loopbacks cannot be activated on the same port simultaneously.

Loopbacks

7.11 V.35/EIA-530 Loopbacks

The V.35/EIA-530 physical layer supports line and local loopbacks.

7.11.1 Line Loopbacks

- Connects the received data stream after decoding to the input of the V.35/EIA-530 framer.
- Data input to the port is passed to the *CellPath* 300 bus; data coming from the *CellPath* 300 bus is lost.
- V.35/EIA-530 handshake lines are treated normally.
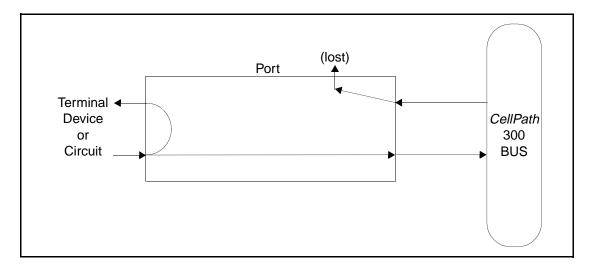
Figure 7.24 - Line Loopback, V.35/EIA-530

7.11.2 Local Loopbacks

- Loops data from the *CellPath* 300 bus back to its source.
- Configure appropriate connections to use this loopback.
- Data from the *CellPath* 300 bus is passed through; data input to the port is lost.
- V.35/EIA-530 handshake lines are ignored.
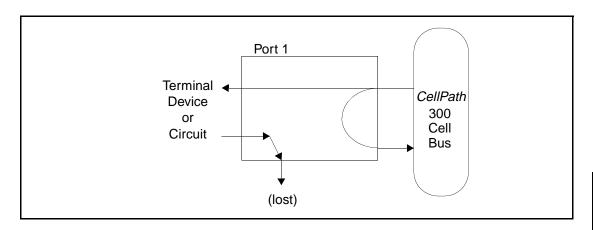
Figure 7.25 - Local Loopback, V.35/EIA-530

7.11.3 Setting Loopbacks

Use one of these methods to set a line loopback on a V.35/EIA-530 port:

- Asserting the LL(141) signal
- Selecting `Line` for the `Port Loopback` option in the `Port Configuration` Screen
- Setting the `V.35Loopback` instance to `V.35DteLineLb` via the SNMP agent

Use one of these methods to set a local loopback on a V.35/EIA-530 port:

- Selecting `Local` for the `Port Loopback` option in the `Port Configuration` screen
- Setting the `V.35Loopback` instance to `V.35LocalLb` via the SNMP agent

Loopbacks

Use one of these methods to remove all loopbacks from a V.35/EIA-530 port:

- De-asserting the LL(141) control signal
- Selecting `None` for the `Port Loopback` option in the `Port Configuration` screen
- Setting the `V.35Loopback` instance to `V.35NoLoopback` via the SNMP agent

Local loopbacks are activated and deactivated from the user interface or SNMP agent only.

Two types of loopbacks cannot be activated on the same port simultaneously.

7.12 HSSI Loopbacks

The HSSI physical layer supports line and local loopbacks.

7.12.1 Line Loopbacks

- Takes received data and loops it directly back to the transmit signal leads.
- Data input to the port is passed to the *CellPath* 300 bus; data coming from the *CellPath* 300 bus is lost.
- HSSI handshake lines are treated normally.
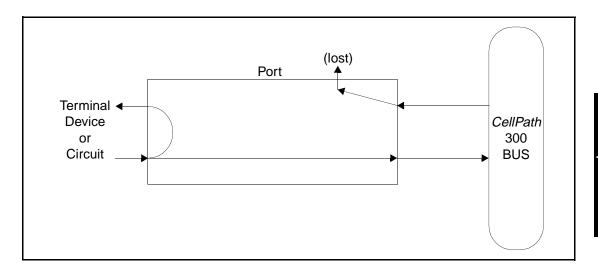
Figure 7.26 - Line Loopback, HSSI

7.12.2 Local Loopbacks

- Loops data from the *CellPath* 300 bus back to its source.
- Configure appropriate connections to use this loopback.
- Data from the *CellPath* 300 bus is passed through; data input to the port is lost.
- HSSI handshake lines are ignored.
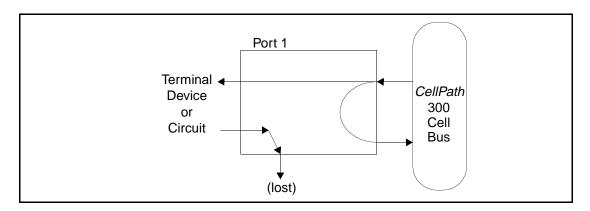
Figure 7.27 - Local Loopback, HSSI

7.12.3 Setting Loopbacks

Use one of these methods to set a line loopback on a HSSI port:

- Selecting `Line` for the `Port Loopback` option in the `Port Configuration` screen
- Setting the `V.35Loopback` instance to `V.35DteLineLb` via the SNMP agent

Use one of these methods to set a local loopback on a HSSI port:

- Selecting `Local` for the `Port Loopback` option in the `Port Configuration` screen
- Setting the `V.35Loopback` instance to `V.35LocalLb` via the SNMP agent

Use one of these methods to remove all loopbacks from a HSSI port:

- Selecting `None` for the `Port Loopback` option in the `Port Configuration` screen
- Setting the `V.35Loopback` instance to `V.35NoLoopback` via the SNMP agent
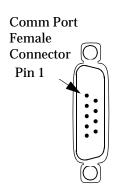
Local loopbacks are activated and deactivated from the user interface or SNMP agent only.

Two types of loopbacks cannot be activated on the same port simultaneously.

APPENDIX A   Connector Pinouts

This appendix contains the following tables:
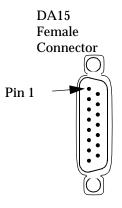
- Comm port pinouts
- DSX-1 and E1 DA15 connector pinouts
- E1 DA15 connector pinouts
- 8-pin connector pinouts, IMA/DS1 and IMA/E1
- V.35 DB25 connector pinouts
- EIA-530 DB25 connector pinouts
- EIA-449 (RS449) connector pinouts
- HSSI connector pinouts

Table A.1 - Comm Port Pinouts

Comm Port
Female
Connector
Pin 1
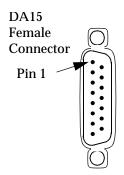
Pin	CCITT	Signal Name	Source	Direction
1	109	Rec Sig Det (DCD)	DCE	Output
2	104	Received Data	DCE	Output
3	103	Transmit Data	DTE	Input
4	108.2	DTE Ready (DTR)	DTE	Input
5	102	Signal GND		
6	107	Data Set Ready (DSR)	DCE	Output
7	105	Request To Send (RTS)	DTE	Input
8	106	Clear To Send (CTS)	DCE	Output
9	125	Ring Indicator (RI)	DCE	Output

Connector Pinouts

Table A.2 - DSX-1 DA15 Connector Pinouts

DA15
Female
Connector

Pin 1 →

Pin	Circuit Name	Direction
1	Rx Data (T1)	Input
2	Frame ground and shield	
3	Tx Data (T)	Output
4	Frame ground and shield	
9	Rx Data (R1)	Input
11	Tx Data (R)	Output
5,6,7,8,10,12,13,14,15	Unused	

Table A.3 - E1 DA15 Connector Pinouts

DA15
Female
Connector

Pin 1 →

Pin	Circuit Name	Direction
1	Tx Data (T1)	Output
2	Frame ground and shield	
3	Rx Data (T)	Input
4	Frame ground and shield	
9	Tx Data (R1)	Output
11	Rx Data (R)	Input
5,6,7,8,10,12,13,14,15	Unused	
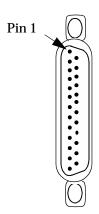
Table A.4 - 8-Pin Connector Pinouts, IMA/DS1 and IMA/E1

RJ48C

Pin 1

Pin	Circuit Name
1	Rx Data (R)
2	Rx Data (T)
4	Tx Data (R1)
5	Tx Data (T1)
7,8	Frame ground
3,6	No connection

Connector Pinouts

Table A.5 - DB25 to V.35 Connector Pinouts

DB25
Female
Connector

Pin 1

DB25 Pins	V.35 Pins	CCITT	Circuit Name	Source
1	A		Protective GND	
2	P	(a) 103	Tx Data A	DTE
3	R	(a) 104	Rx Data A	DCE
4	C	105	RTS	DTE
5	D	106	CTS	DCE
6	E	107	DSR	DCE
7	B	102	Signal GND	
8	F	109	Rec Line Sig Det (DCD)	DCE
9	X	(b) 115	Rx Timing B	DCE
11	W	(b) 113	External clock B	DTE
12	AA	(b) 114	Tx Timing B	DCE
14	S	(b) 103	Tx Data B	DTE
15	Y	(a) 114	Tx Signal Timing A	DCE
16	T	(b) 104	Rx Data B	DCE
17	V	(a) 115	Rx Signal Timing A	DCE
18	L	141	LL (Local Loopback)	DTE
20	H	108.2	DTR	DTE
21	N	140	RL (Remote Loopback)	DTE
24	U	(a) 113	External Clk A	DTE
25	NN	142	TM (Test Mode)	DCE
10, 13, 19, 22, 23			Unused	

NOTE: For tail-circuit timing (DTE does not support external clock on pins 11 and 24) at this port, jumper pins 11 to 12 and 15 to 24 in the DB25 connector.

Table A.6 - DB25 Connector Pinout for EIA-530

Pin	Designator CCITT/EIA	Circuit Name	Source
1	—	Shield	—
2	(a) 103/BA	BA (A), Transmitted Data	DTE
3	(a) 104/BB	BB (A), Received Data A	DCE
4	(a) 105/CA	CA (A), Request To Send A (RTS)	DTE
5	(a) 106/CB	CB (A), Clear To Send A (CTS)	DCE
6	107/CC	CC (A), DCE Ready (DSR)	DCE
7	102/AB	AB, Signal Ground	DTE
8	(a) 109/CF	CF (A), Received Line Signal Detector	DCE
9	(b) 115/DD	DD (B), Receiver Signal Element Timing	DCE
10	(b) 109/CF	CF (B), Received Line Signal Detector	DCE
11	(b) 113/DA	DA (B), Transmit Signal Element Timing	DTE
12	(b) 114/DB	DB (B), Transmit Signal Element Timing	DCE
13	106/CB	CB (B), Clear To Send	DCE
14	(b) 103/BA	BA (B), Transmitted Data	DTE
15	(a) 114/DB	DB (A), Transmit Signal Element Timing	DCE
16	(b) 104/BB	BB (B), Received Data	DCE
17	(a) 115/DD	DD (A), Receiver Signal Element Timing	DCE
18	141	LL (Local Loopback)	DTE
19	(b) 105/CA	CA (B), Request To Send	DTE
20	108.2/CD	CD (A), DTE Ready	DTE
21	140	RL (Remote Loopback)	DTE
22	(b) 107/CC	CC (B), DCE Ready	DCE
23	108.2/CD	CD (B), DTE Ready	DTE
24	113/DA	DA (A), Transmit Signal Element Timing	DTE
25	142	TM (Test Mode)	DCE

Connector Pinouts

Table A.7 - DB25 Connector to EIA-449 (RS449), DC37 Connector Adapter Cable

EIA-530 DB25 Pins	EIA-449 DC37 Pins	Circuit Name
1	—	Protective ground
2	4	Tx data A
3	6	Rx data A
4	7	RTS A
5	9	CTS A
6	11	DSR A
7	19	Signal GND
8	13	Rec line sig det A (DCD)
9	26	Rx signal timing B
10	31	Rec line sig det B (DCD)
11	35	External clk B (DTE source)
12	23	Tx signal timing B
13	27	CTS B
14	22	Tx data B
15	5	Tx signal timing A
16	24	Rx data B
17	8	Rx signal timing A
18	10	LL (Local Loopback)
19	25	RTS B
20	12	DTR A
21	14	RL (Remote Loopback)
22	29	DSR B
23	30	DTR B
24	17	External clk A (DTE source)
25	18	TM (Test Mode)
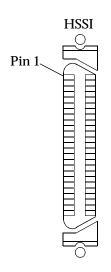
Table A.8 - HSSI Connector Pinouts

HSSI

Pin 1

Pin +	Pin -	Mnemonic	Circuit name
1	26	SC	Signal common
2	27	RSET-DCE	Receive Timing
3	28	DSR	DCE Ready
4	29	RDATA	Receive Data
5	30		reserved
6	31	TSET-DCE	Transmit Signal Element Timing
7	32	SC	Signal Common
8	33	DTR	DTE Ready
9	34	TSET-DTE	Transmit Signal Element Timing
10	35	LA	Loopback Circuit A
11	36	TDATA	Transmit Data
12	37	LB	Loopback Circuit B
13	38	SC	Signal Common
14-18	39-43		5 Ancillary to DCE
19	44		Signal Common
20	45	TSETIN	Defined input
21-24	46-49		4 Ancillary from DCE
25	50		Signal Common

Connector Pinouts

Connector Pinouts

CellPath 300 ATM WAN Multiplexer Installation and Maintenance Manual

APPENDIX B   LED Definitions

System Controller LEDs

Protocol Module LEDs

SYSTEM STATUS

Front-panel LEDs

POWER A

POWER B

DCE COMM PORT
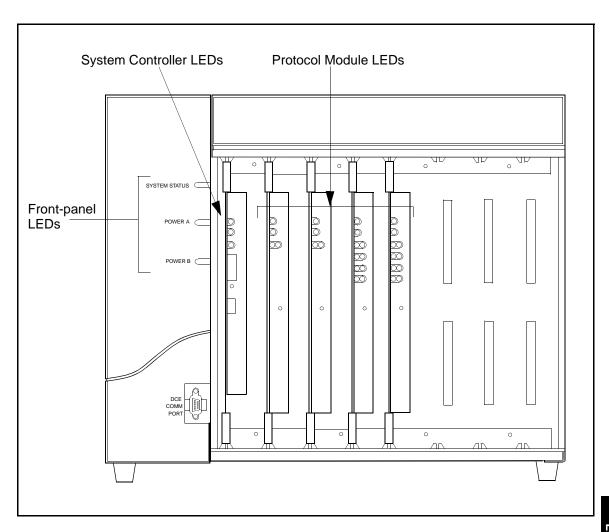
Figure B.1 - Locations of LEDs

Table B.1 - LED Definitions

LED	State	Description
Front Panel LEDS		
System Status	Red	An alarm is present in the system.
	Green	No alarm is present. The system is operating normally.
	Off	No power is being applied to the system.
Power A (upper)	Red	A power supply is installed in the upper power supply slot, but it is not delivering the correct voltages to the system. Refer to the label on the back panel of the supply for voltage ratings.
	Green	A power supply is installed in the upper power supply slot and is operating normally.
	Off	No power supply is installed in the upper power supply slot.
Power B (lower)	Red	A power supply is installed in the lower power supply slot, but it is not delivering the correct voltages to the system. Refer to the label on the back panel of the supply for voltage ratings.
	Green	A power supply is installed in the lower power supply slot and is operating normally.
	Off	No power supply is installed in the lower power supply slot.
System Controller LEDs		
Module Status	Red	Illuminates red if any of the Port IN/OUT LEDs are red, which may occur if ports are not completely configured or connected. The status LED also illuminates red if an alarm exists on the protocol or physical layer module.
	Green	No alarm exists on the System Controller or Extension module.
Major Alarm	Red	A major (i.e., service-affecting) alarm exists on one or more of the modules within the *CellPath* 300 chassis.
	Green	No major alarms exist in the system.

Table B.1 - LED Definitions

LED	State	Description
Minor Alarm	Red	A minor alarm exists on one or more of the modules within the *CellPath* 300 chassis.
	Green	No minor alarms exist in the system.
Protocol Module LEDs		
Status	Red	An alarm exists on the protocol or physical layer module.
	Green	No alarm exists on the protocol or physical layer module.
Test	Red	The protocol module or its paired physical layer module failed self-test.
	Green	A test (e.g., a loopback) is being performed that affects the normal flow of data through the protocol and physical layer modules.
	Off	Normal operation. No tests are active.
Port IN	Red	The LED is red if the port is not configured or is not connected to an appropriately configured DTE. If the port is a CBR port, the LED may also be red if it has been assigned a connection and valid data is not yet being transmitted. The LED is also red when an alarm exists on the output direction for the port, either on the protocol or physical layer module.
	Green	No alarm exists on the port and data is being received. (Note: The LED flashes when the traffic is intermittent.)
	Off	No alarm exists on the port and no data is being received.

LED Definitions

Table B.1 - LED Definitions

LED	State	Description
Port OUT	Red	The LED is red if the port is not configured or is not connected to an appropriately configured DTE.
		If the port is a CBR port, the LED may also be red if it has been assigned a connection and valid data is not yet being transmitted.
		The LED is also red when an alarm exists on the output direction for the port, either on the protocol or physical layer module.
	Green	No alarm exists on the port and data is being transmitted. (Note: The LED flashes when the traffic is intermittent.)
	Off	No alarm exists on the port and no data is being transmitted.

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